Slides for International Finance

Aggregate Demand and the SR (KOMIF 6; KOMIE 17)

Alan G. Isaac
American University

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PREVIEW: The AA-DD Model

AA Curve

- review SR model of asset market equilibrium
- AA: $\uparrow$Y $\rightarrow$ $\downarrow$E (to maintain asset mkt eq)

DD Curve

- SR model of output market equilibrium
- DD: $\uparrow$E $\rightarrow$ $\uparrow$Y (to maintain asset mkt eq)

SR Model

- AA-DD model: simultaneous output market and asset market equilibrium
- temporary vs permanent changes in monetary and fiscal policies
- liquidity trap (zero interest rates, deflation, stimulus)
- Adjustment of the current account over time.

IS-LM model (optional)

- alternative perspective on the same results

SR vs. LR Models

LR models: all prices of inputs and outputs have time to adjust.

- used to predict future exchange rate tendencies
- $\therefore$ suggest ways of thinking about how market participants form expectations

SR models: some prices of inputs and outputs do not fully adjust

- labor contracts
- costs of adjustment
- imperfect information about market demand.

Goal of the AA-DD model

- show how macroeconomic policies affect E, Y, and CA
  - in the SR *and* LR

Short-Run Equilibrium in Asset Markets

Recall the SR model of two related asset markets:

foreign exchange market (UIP): $R = R^* + (E^e - E)/E$

money market: $M/P = L[R, Y]$

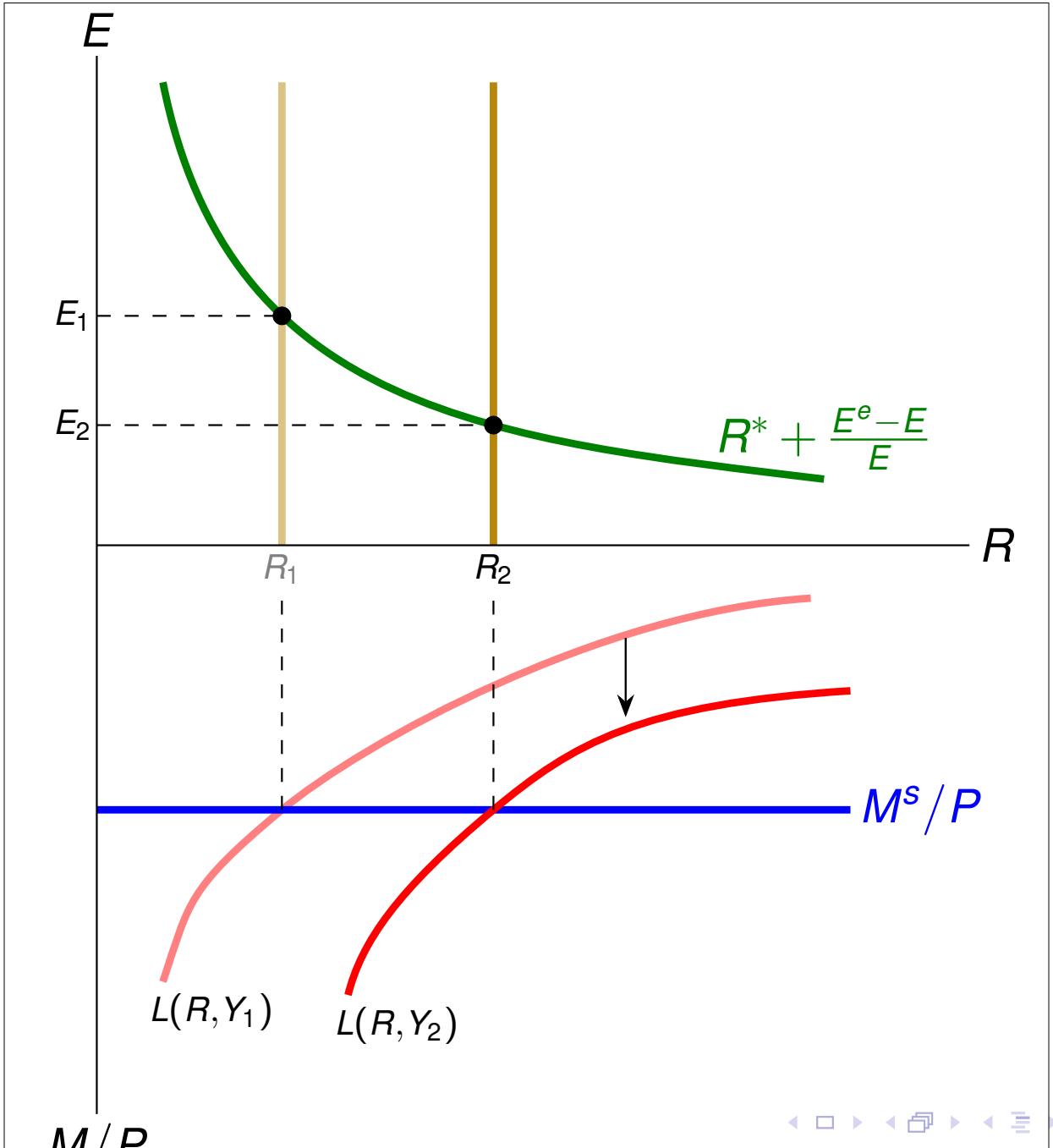
Use these to derive AA curve from the effects of an increase in GDP:

Money market: $\uparrow$Y $\rightarrow \uparrow$L $\rightarrow$ (M/P < L) $\rightarrow \uparrow$R

Foreign exchange market: $\uparrow$R $\rightarrow \downarrow$E

Summary: $\uparrow$Y $\rightarrow \downarrow$E

Output and the Exchange Rate in Asset Market Equilibrium

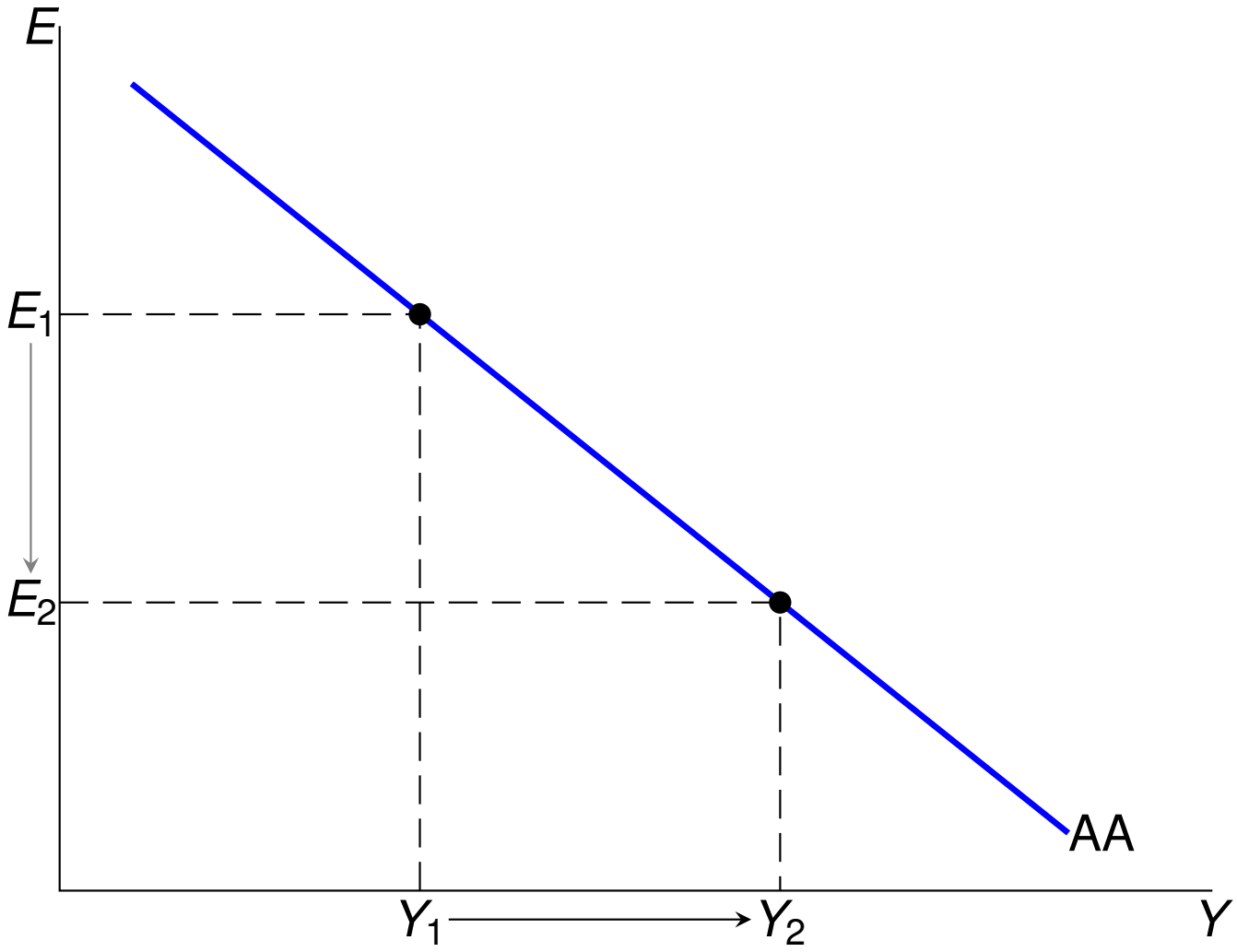


Short-Run Equilibrium in Asset Markets: AA Curve

AA Curve

- equilibrium in financial markets (money market and foreign exchange market)
- inverse relationship between output and exchange rates (as derived above)

The AA Schedule



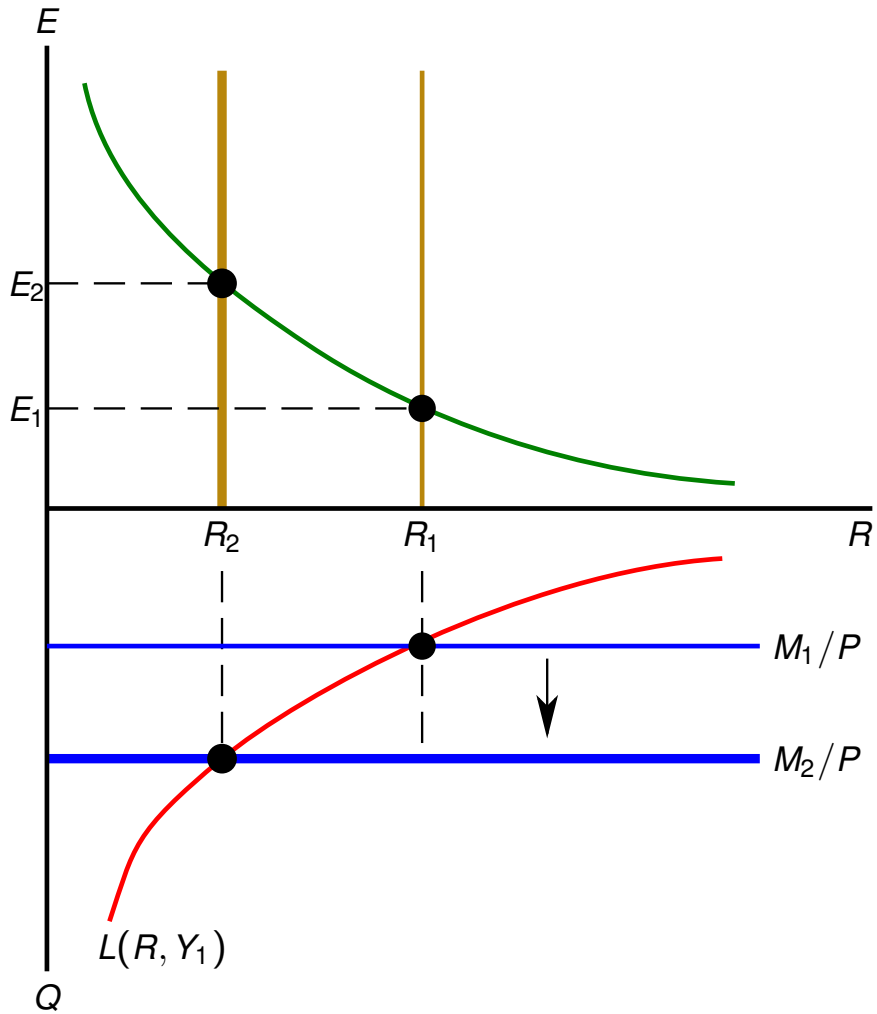
Note

Compare KOMIE 12 Fig 17-7.

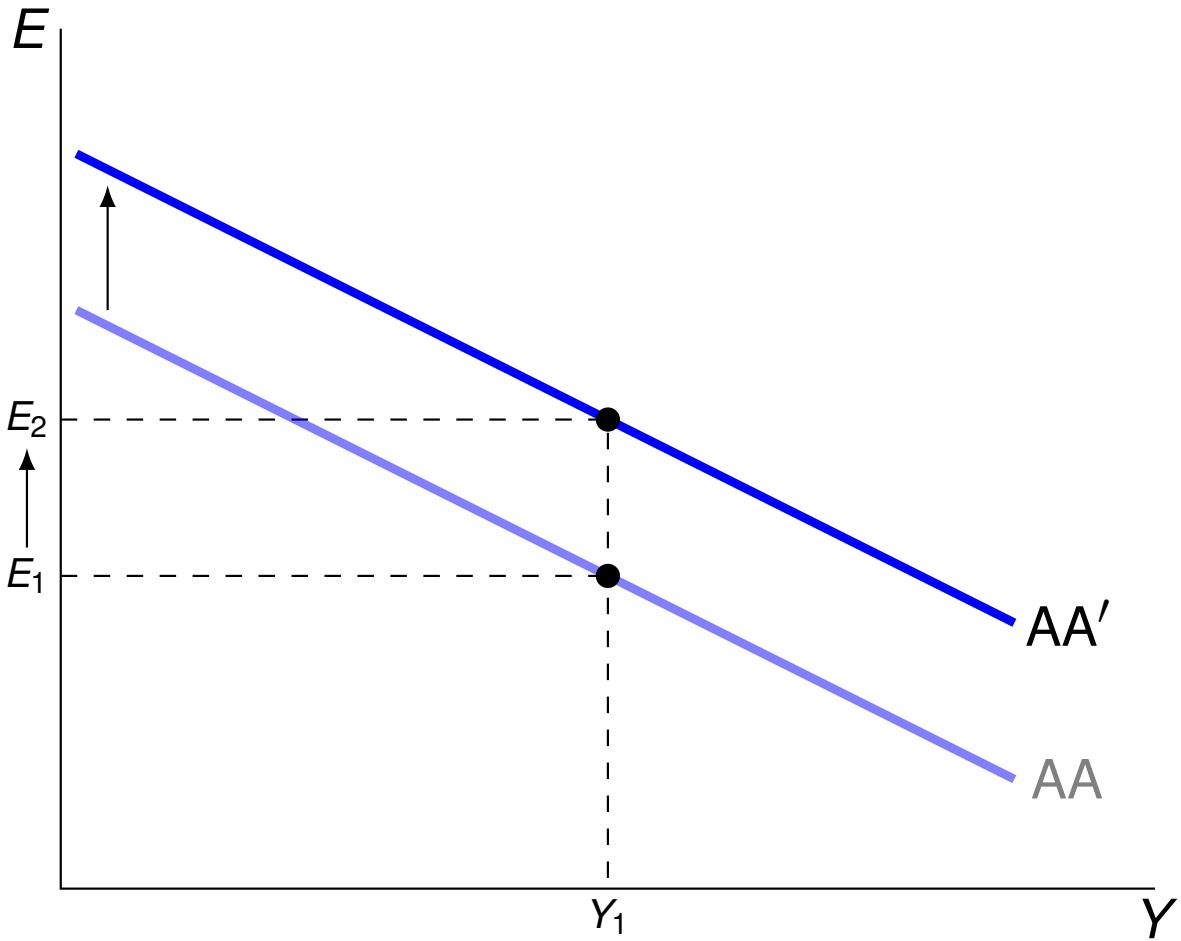
Shifting the AA Curve

1. $\uparrow$M $\rightarrow$ $\downarrow$R (in the short run) $\rightarrow$ $\uparrow$E (for every Y): the AA curve shifts up
2. $\uparrow$P $\rightarrow$ $\downarrow$M/P $\rightarrow$ $\uparrow$R $\rightarrow$ $\downarrow$E (given Y): the AA curve shifts down
3. $\uparrow$L (exogenously) $\rightarrow$ $\uparrow$R $\rightarrow$ $\downarrow$E (given Y): the AA curve shifts down
4. $\uparrow$R* $\rightarrow$ foreign currency deposits more attractive $\rightarrow$ $\uparrow$E (given Y): the AA curve shifts up
5. $\uparrow$ E^e: if market participants expect the future domestic currency to be depreciated, foreign currency deposits become more attractive, $\rightarrow$ $\uparrow$E (given Y): the AA curve shifts up

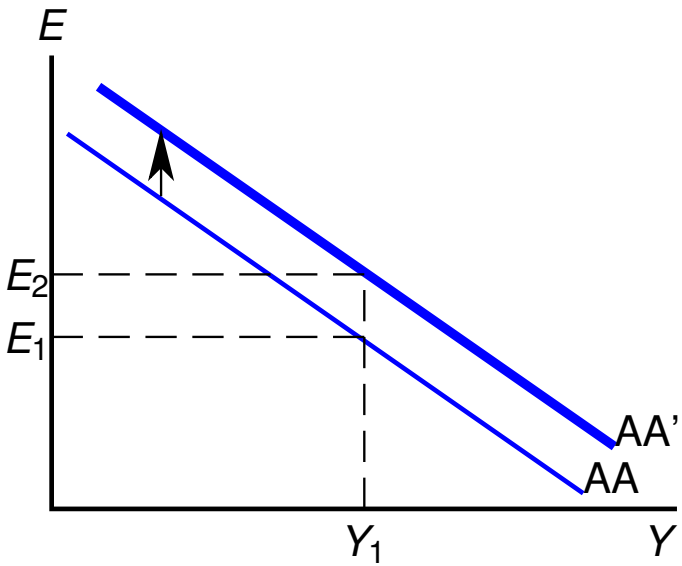
↑M → ↑E in Assets Markets

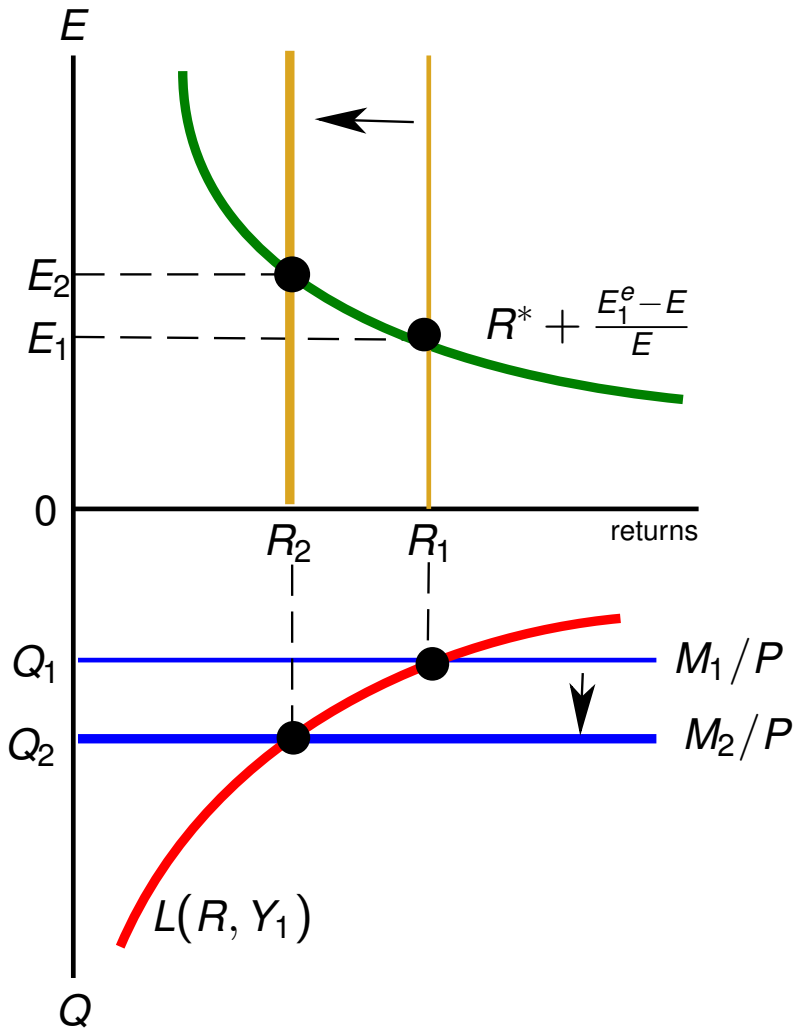


$\uparrow$M $\rightarrow$ AA Shifts Up

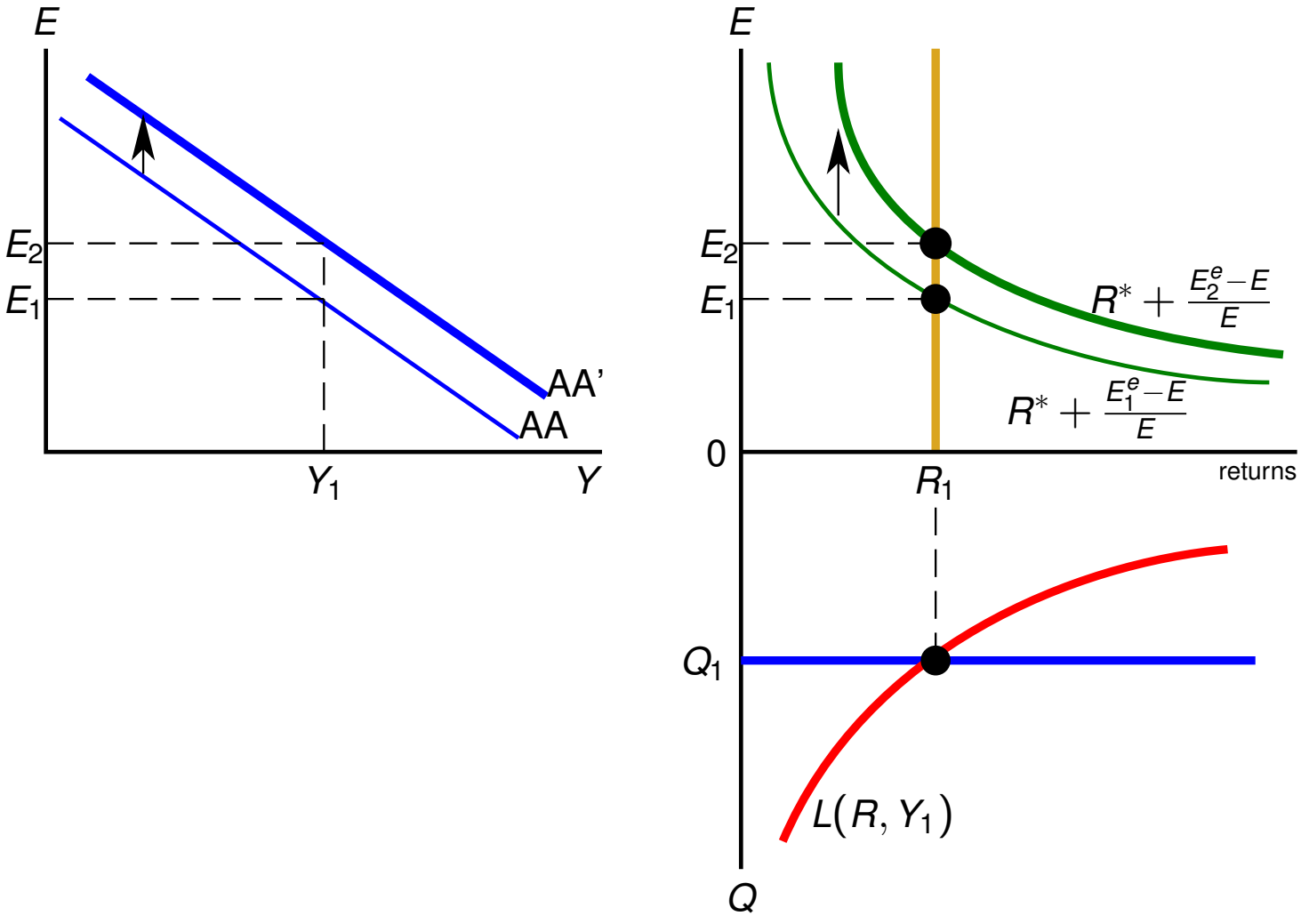


↑M → AA Shifts Up





Expectations and the AA Curve



Summary: ↑Ee → AA Shifts Up

Determinants of Aggregate Demand

Aggregate demand the aggregate amount of final goods and services that individuals and institutions are willing and able to buy

- C: consumption expenditure
- I: investment expenditure
- G: government expenditure (*purchases* of final goods and services)
- CA: net expenditure by foreigners (the current account)

Absorption: the aggregate domestic expenditure on final goods and services, regardless of source
C + I + G

Determinants of Consumption Demand

disposable income ($Y_d = Y - T$)

- $\uparrow$(Y-T) $\rightarrow$ $\uparrow$C (mpc < 1)

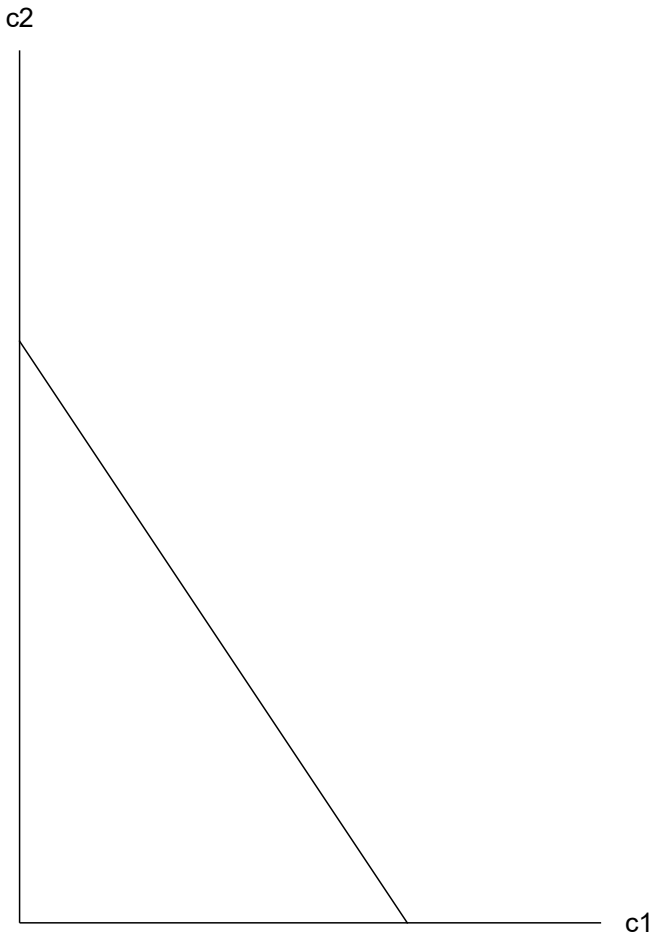
real interest rates

- theoretically indeterminate (conflicting income and substitution effects)
- empirically hard to detect
- we will ignore

Wealth

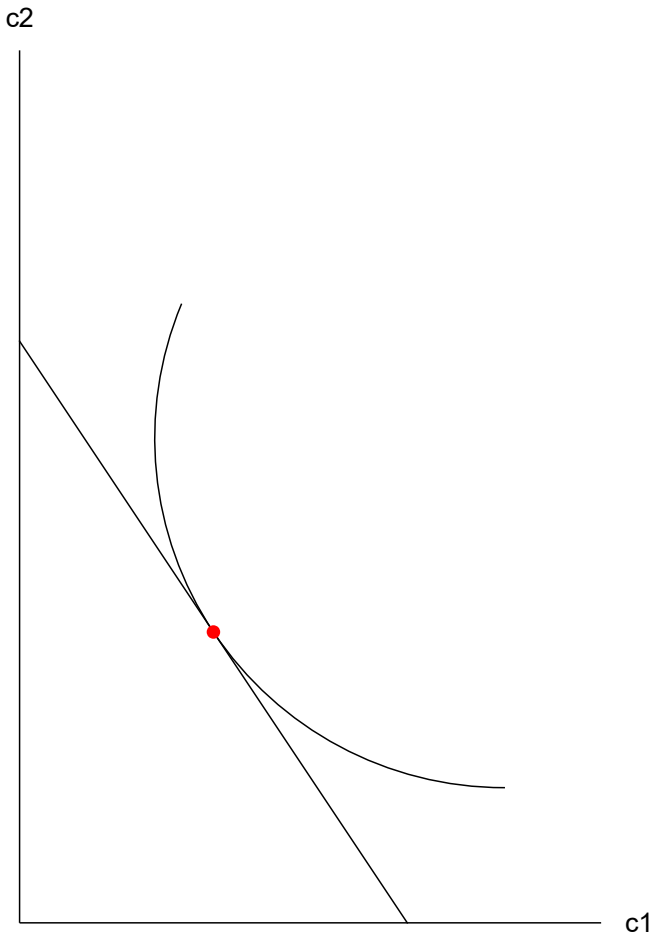
- important theoretically and empirically
- nevertheless, we will ignore
  - assume that wealth is relatively constant and thus a relatively unimportant consideration over our time horizon

Intertemporal Budget Constraint



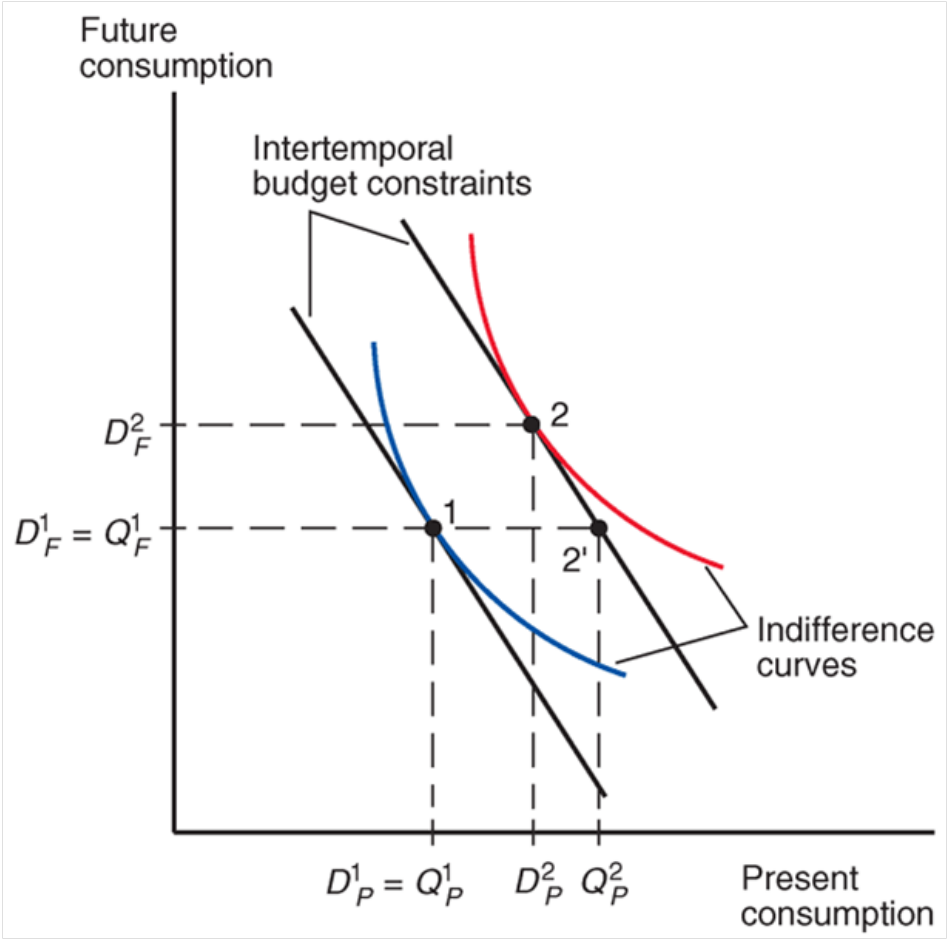
Tradeoff between present and future consumption.

Intertemporal Optimization



Tradeoff between present and future consumption.

Income Shocks and Consumption (mpc < 1)



Effects of a positive shock to current income (Q_p). Source: KOM 17A1-1

Determinants of the Current Account

Current account: $CA[\overbrace{EP^*/P}^{+}, \overbrace{Y-T}^{-}]$

- disposable income ($Y_d = Y - T$)
  $\uparrow$(Y-T) $\rightarrow$ $\uparrow$Im (mpm < 1)
- real exchange rate ($q = EP*/P$)
  theoretically indeterminant, but we assume:
  $\uparrow$q $\rightarrow$ $\uparrow$Ex, $\downarrow$Im $\rightarrow$ $\uparrow$(Ex-Im)
  expenditure shifting: expenditure on domestic products rises, and expenditure on foreign products falls.

Determinants of Aggregate Demand

- Determinants of the current account include:
  - Real exchange rate: an increase in the real exchange rate increases the current account.
  - Disposable income: an increase in the disposable income decreases the current account.

CA/GDP vs. EP*/P in the US

https://fred.stlouisfed.org/graph/?g=Cho7

Compare KOM (which inverts the real exchange rate).

Determinants of Aggregate Demand (cont.)

I, G and T are *exogenous*

- G and T determined by political factors we do not model
- I is determined by exogenous business decisions (for now)
  - (later we let I depend on the interest rate (i.e., on the cost of borrowing to finance investment)

Consumption $C[Y-T]$

Current account $CA[EP*/P, Y-T]$

Aggregate demand $\underbrace{C[Y-T]+I+G+CA[EP^*/P, Y-T]}_{D[EP^*/P, Y-T, I, G]}$

Determinants of Aggregate Demand (cont.)

Summarize the determinants of aggregate demand:

- D = D[EP* /P, Y-T, I, G]
- $\uparrow$q $\rightarrow$ $\uparrow$CA $\rightarrow$ $\uparrow$D
- $\uparrow$(Y-T) $\rightarrow$ $\uparrow$C $\rightarrow$ $\uparrow$D (even though $\uparrow$IM)

mpm < mpc < 1

Short-Run Equilibrium for Aggregate Demand and Output

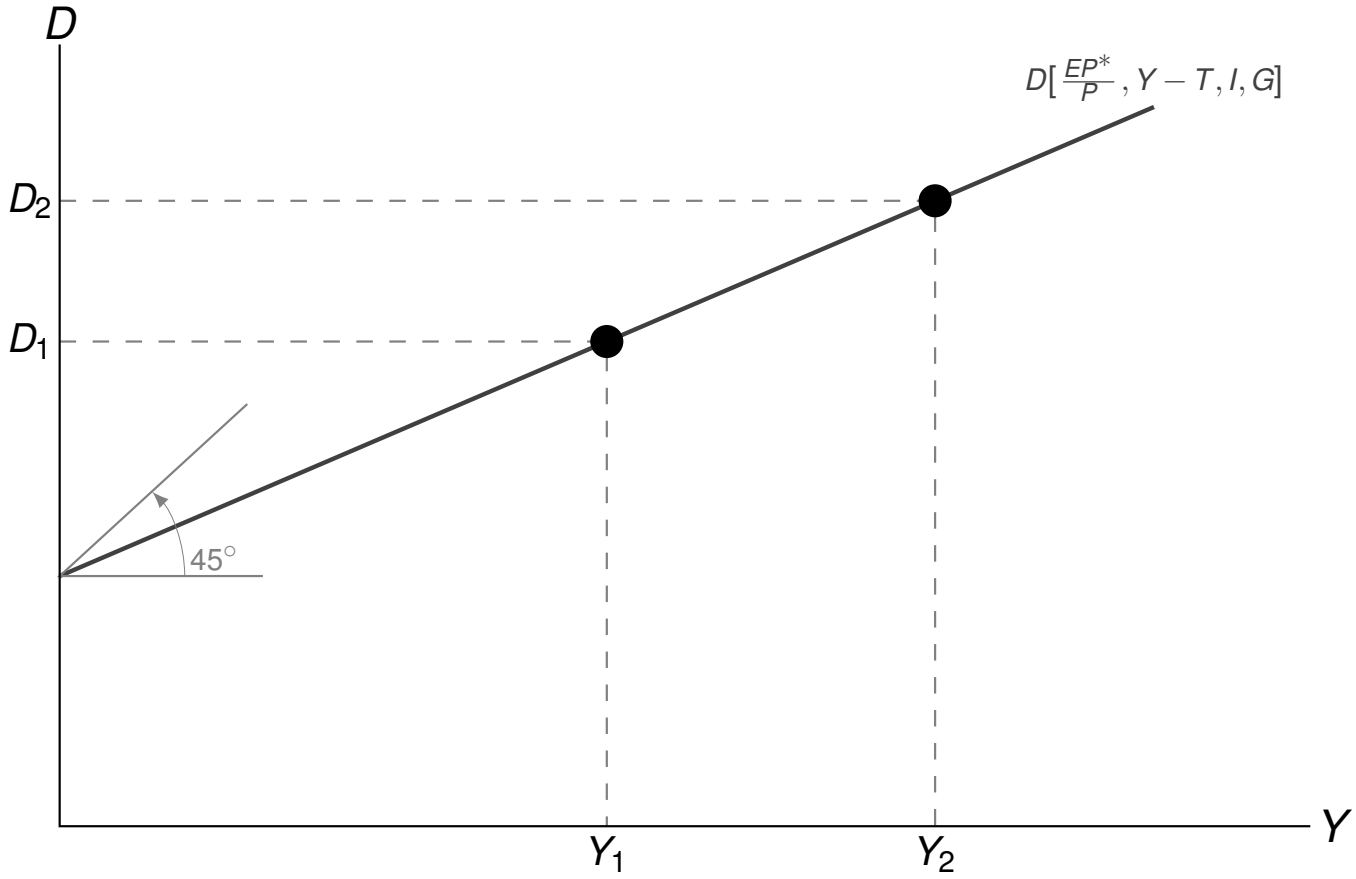
The DD curve is derived from a simple short-run (Keynesian) model of the goods market, where GDP responds to demand.
Aggregate demand is a function of:

- the real exchange rate (EP*/P)
- disposable income (Y-T)
- investment expenditure (I)
- government purchases of final goods and services (G)

Equilibrium: our aggregate output (Y) equals the aggregate demand for our output (D)

$$Y = D[EP^*/P, Y - T, I, G]$$

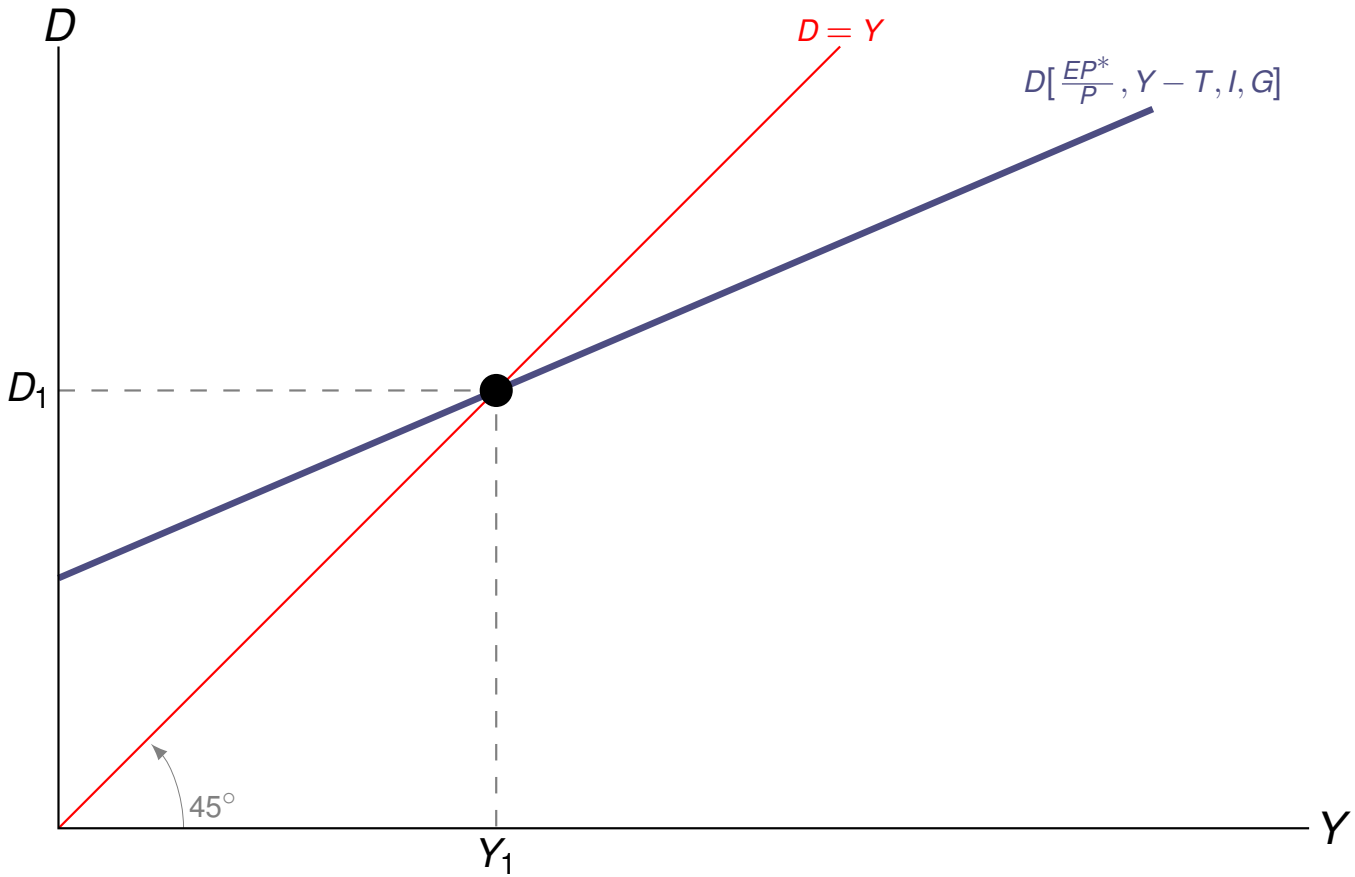
Aggregate Demand as a Function of Output



Note

Compare KOMIE 12 Fig 17-1.

The Determination of Output in the Short Run



Compare KOMIE 12 Fig 17-2

AD > Y $\rightarrow$ firms increase output; AD < Y $\rightarrow$ firms decrease output

Short-Run Equilibrium and the Exchange Rate: DD Schedule

The derivation of the DD curve involves answering a key question:

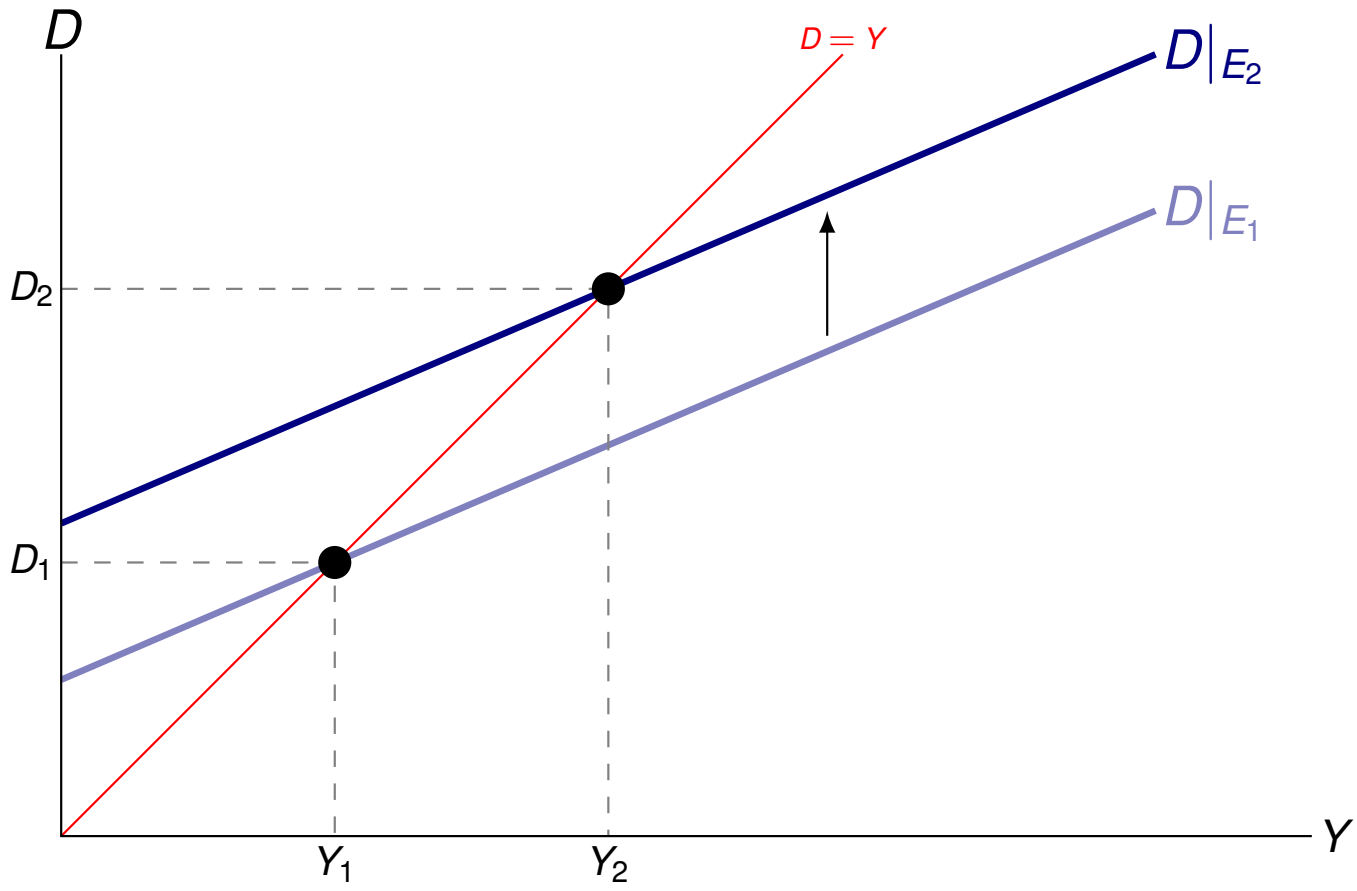
How does E affect AD?

- A depreciation makes foreign goods and services relatively expensive (given domestic and foreign prices).
- Aggregate demand shifts toward domestic products.
- Output responds to demand.

In equilibrium, production will increase to match the higher aggregate demand.

Of course, this assumes satisfaction of the Marshall-Lerner condition.

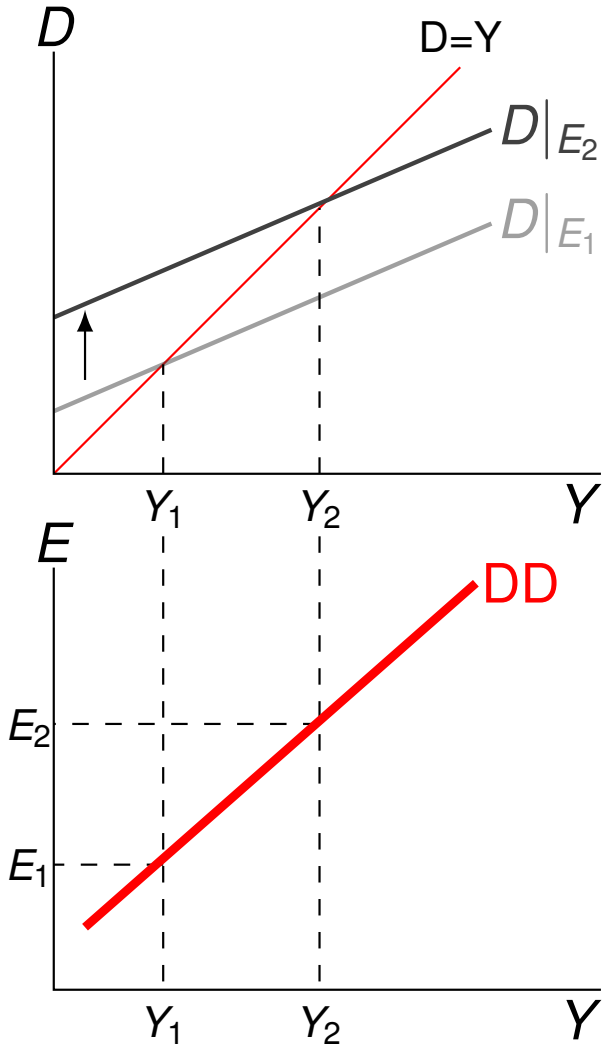
Output Effect of ↑E with Fixed Output Prices



Compare KOMIE 12 Fig 17-3.

Note: $E_2 > E_1$

Deriving the DD Schedule



Compare KOMIE 12 Fig 17-4.

Note: $E_2 > E_1$

Short-Run Equilibrium and the Exchange Rate: DD Schedule (cont.)

DD schedule

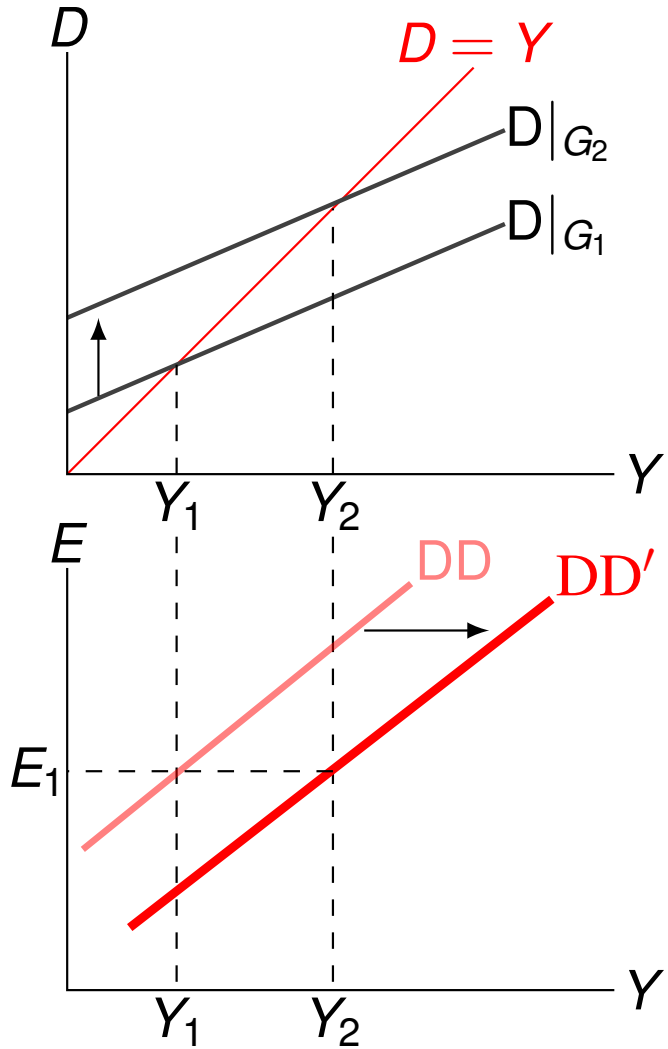
- shows combinations of output and the exchange rate at which the output market is in short run equilibrium (such that aggregate demand = aggregate output).
- slopes upward because a rise in the exchange rate causes aggregate demand and aggregate output to rise.

Shifting the DD Curve

Changes in the exchange rate cause movements *along* the DD curve.
Other changes cause *shifts* of the DD curve.
Exogenous $\uparrow$D $\rightarrow$ DD shifts right:

- $\uparrow$G $\rightarrow \uparrow$ AD $\rightarrow \uparrow$ Y.
- $\uparrow$I $\rightarrow \uparrow$ AD $\rightarrow \uparrow$ Y.
- $\uparrow$Cd (exog) $\rightarrow \uparrow$ AD $\rightarrow \uparrow$ Y. (expenditure increase or switching)
- $\downarrow$T $\rightarrow \uparrow$ C $\rightarrow \uparrow$ AD $\rightarrow \uparrow$ Y.
- $\downarrow$P $\rightarrow \uparrow$ q $\rightarrow \uparrow$ CA $\rightarrow \uparrow$ AD $\rightarrow \uparrow$ Y.
- $\uparrow$ P* $\rightarrow \uparrow$ q $\rightarrow \uparrow$ CA $\rightarrow \uparrow$ AD $\rightarrow \uparrow$ Y.

↑G Shifts the DD Curve to the Right



Compare KOMIE 12 Fig 17-5

Note: $G_2 > G_1$. output increases for every exchange rate: the DD curve shifts right.

Putting the Pieces Together: the DD and AA Curves

Short-run equilibrium: a nominal exchange rate (E) and a level of output (Y) such that we are on both the DD and AA curves

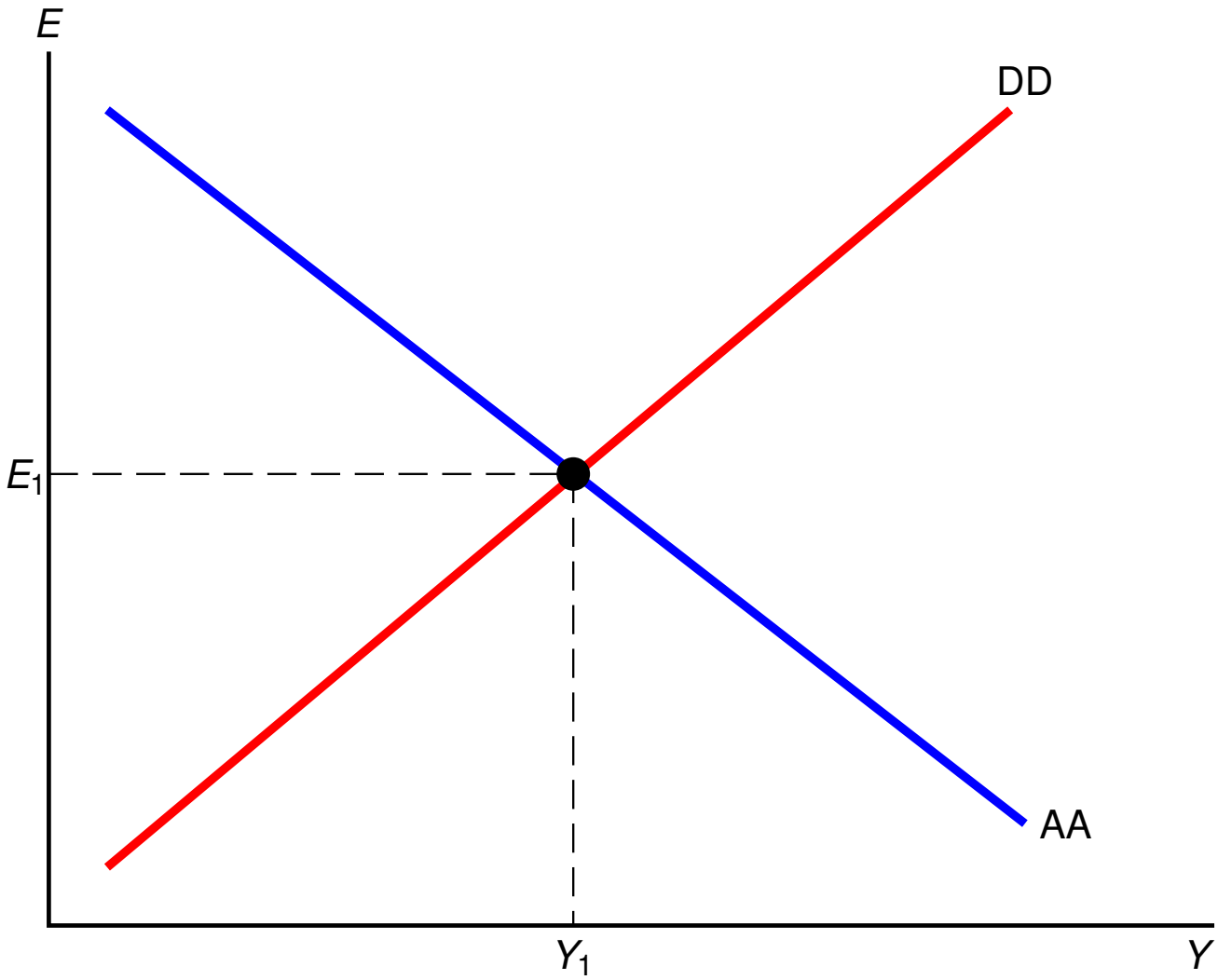
DD curve

- output markets are in equilibrium on the DD curve
- D = Y (aggregate demand equals aggregate output; equilibrium in the output markets)

AA curve

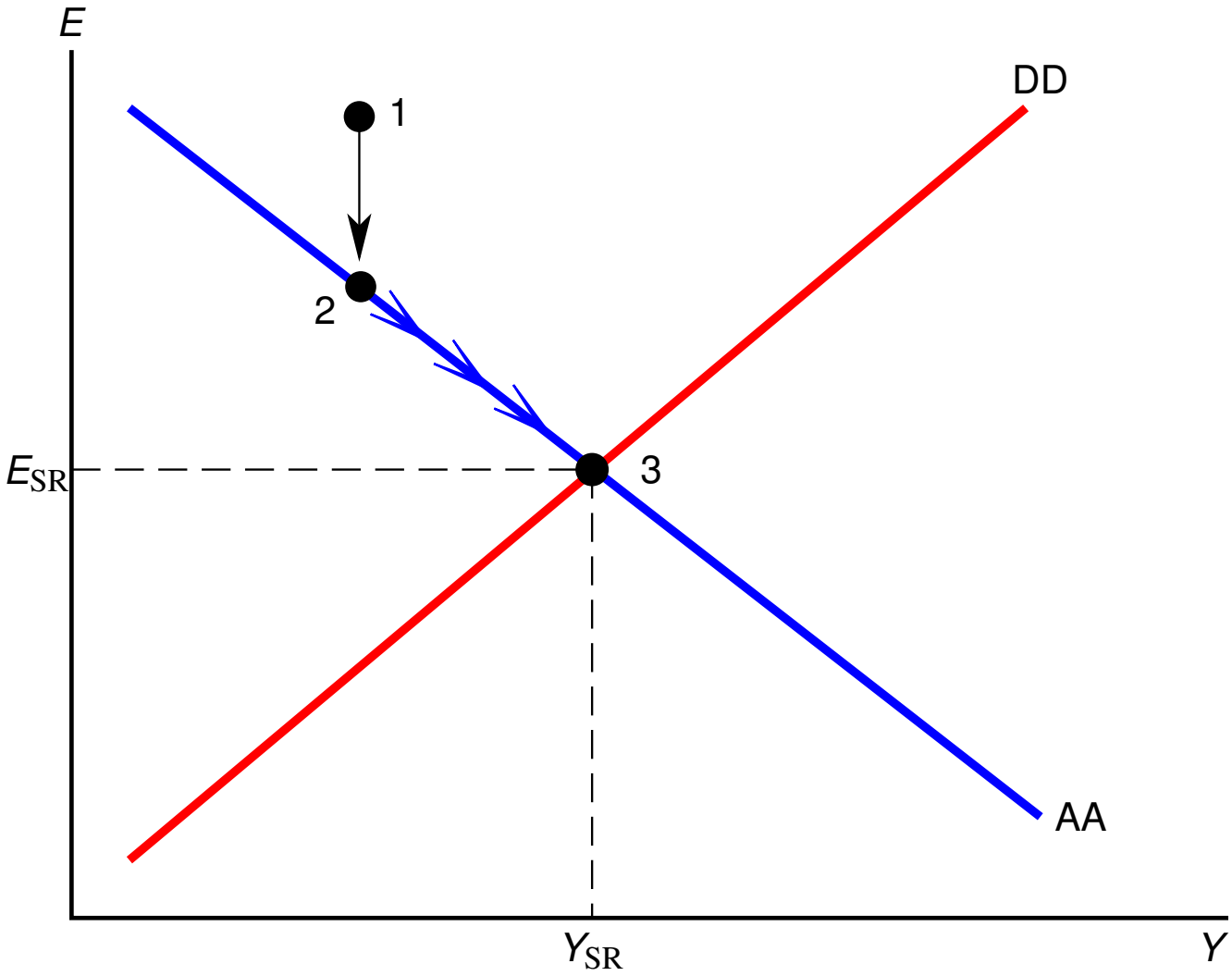
- asset markets are in equilibrium on the AA curve
- $R - R^* = (E^e - E)/E$ (interest parity; equilibrium in the foreign exchange markets)
- $M/P = L$ (real money supply equals real money demand; equilibrium in the money market)

Short-Run Equilibrium in the DD-AA Model



Compare KOMIE 12 Fig 17-8

DD-AA Model: Very Short Run Disequilibrium Adjustment



E adjusts immediately; asset markets are always in equilibrium.
Y adjusts more slowly; commodity markets may be in temporary disequilibrium.

Temporary Changes in Monetary and Fiscal Policy

Monetary policy: the monetary authority (e.g., central bank) influences conditions in the money markets (e.g., the supply of monetary assets)

Fiscal policy the fiscal authority (e.g., treasury) influences aggregate demand via taxation and spending

Temporary policy changes:

- expected to be reversed in the near future
- do *not* affect E^e

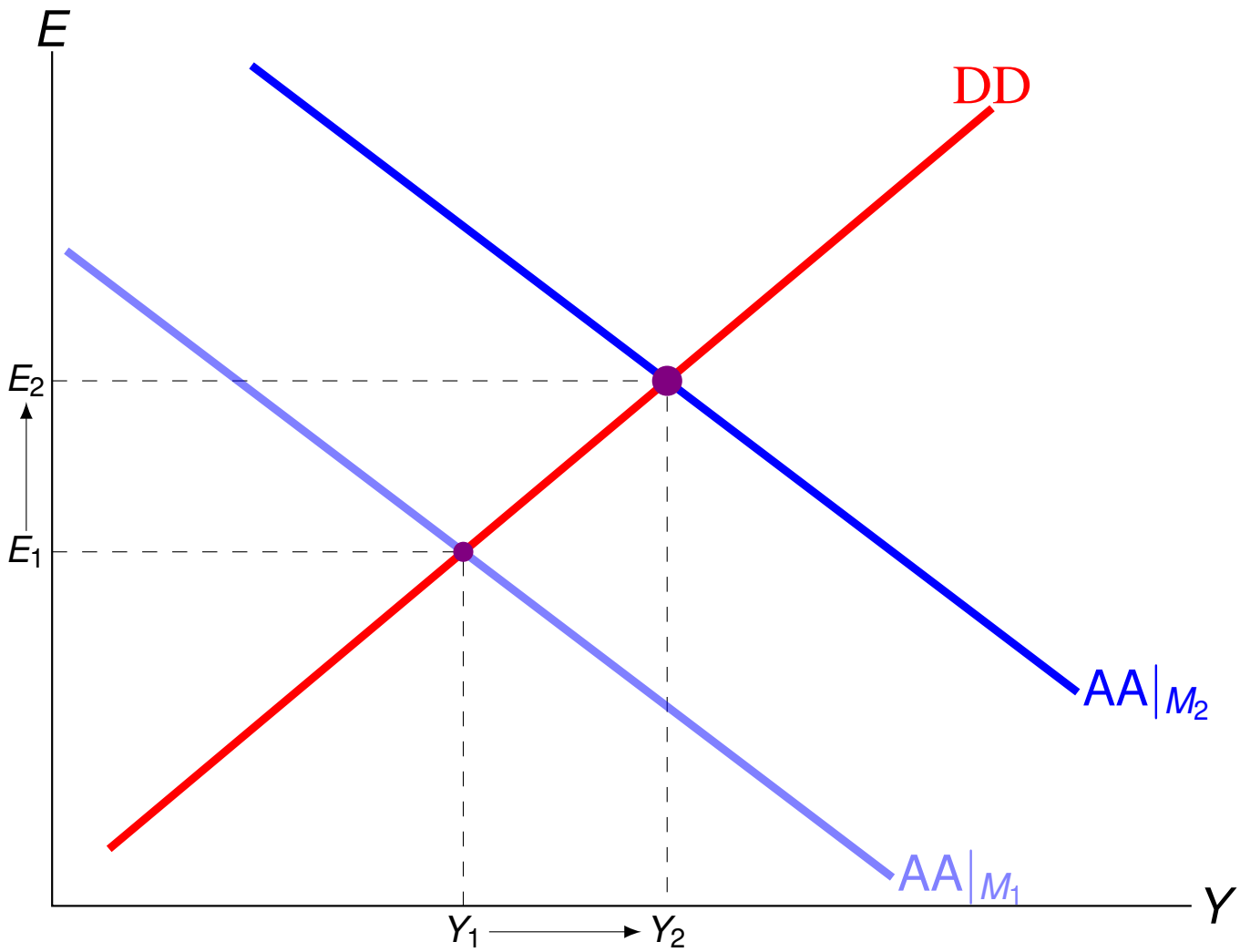
Impact of Temporary ↑M: AA Shifts Up

AA shifts up: $\uparrow M \rightarrow \downarrow R \rightarrow \uparrow E$

Move along DD $\uparrow E \rightarrow \uparrow EP^*/P \rightarrow \uparrow D \rightarrow \uparrow Y$

Note: Recall that the AA shift derives from our analysis in the financial markets.

Temporary ↑M: SR Effects



$M_2 > M_1$

Compare KOMIE 12 Fig 17-10.

Temporary Expansion in Fiscal Policy

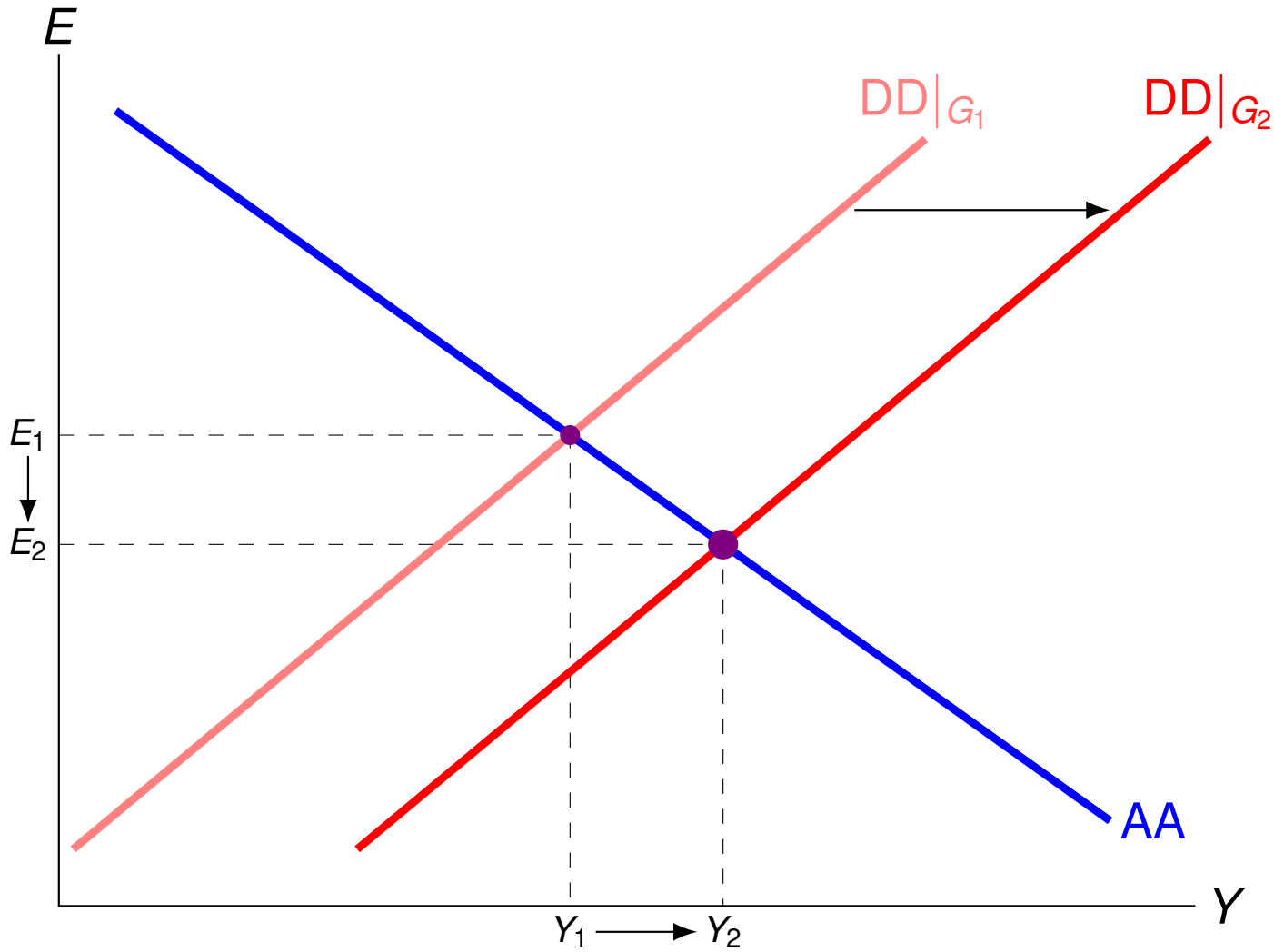
DD curve shifts right:

- Exogenous change in aggregate demand *may* result from fiscal change
- $\uparrow$G $\rightarrow$ $\uparrow$AD or $\downarrow$Tx $\rightarrow$ $\uparrow$AD
- $\uparrow$AD $\rightarrow$ equilibrium Y (at each E)
- i.e., the DD curve **shifts** right.

$\uparrow$**Y** $\rightarrow$ $\uparrow$**L**

- increased demand of real monetary assets increases equilibrium interest rates,
- $\rightarrow$ $\downarrow$E (domestic currency appreciation)
- we **move along** the AA curve

Temporary Fiscal Expansion: SR Effects



Note: $G_2 > G_1$

Compare KOMIE 12 Fig 17-11.

How Big (Small?) Are Empirical Fiscal Multipliers?

2009 Debate

Robert Barro (WSJ, 2009): Peacetime multipliers are essentially zero

Christina Romer (2009): Multiplier is around 1.5

Difference: 3.7 million jobs by the end of 2010

How Big (Small?) Are Empirical Fiscal Multipliers?

Most studies mainly confined to OECD countries: Blanchard and Perotti (2002), Perotti (2004), Uhlig and Mountford (2005), Ramey (2008), Barro and Redlik (2009)

Exception: Ilzetzki, Mendoza, and Vegh (2009):

- 45 country panel (19 high-income, 26 developing)
- quarterly data (1960Q1 - 2007Q4)
- focus on the factors/characteristics that affect the size of the multipliers

Fiscal Multipliers

Question: How does a $1 increase in government expenditure affect GDP?

Impact Multiplier: $\Delta GDP_0 / \Delta G_0$

Cumulative Multiplier $\sum_0^t \Delta GDP_t / \sum_0^t \Delta G_t$

Long-run multiplier: the cumulative multiplier once impulse responses have died down.

Policy Conclusion:

Ilzetzki, Mendoza, and Vegh (2009) find that key country characteristics matter:

- High income versus emerging/developing
- Fixed (predetermined) versus flexible exchange rate regimes
- Open versus closed
- High-debt versus low debt

Worst combination: developing, open, exchange rate flexibility

$\rightarrow$ Not much scope therefore for countercyclical fiscal policy

Potential Output?

What Is Potential Output?

Potential output (Y^f):

- resources are used effectively and sustainably
- production is at the "potential" or "natural" level

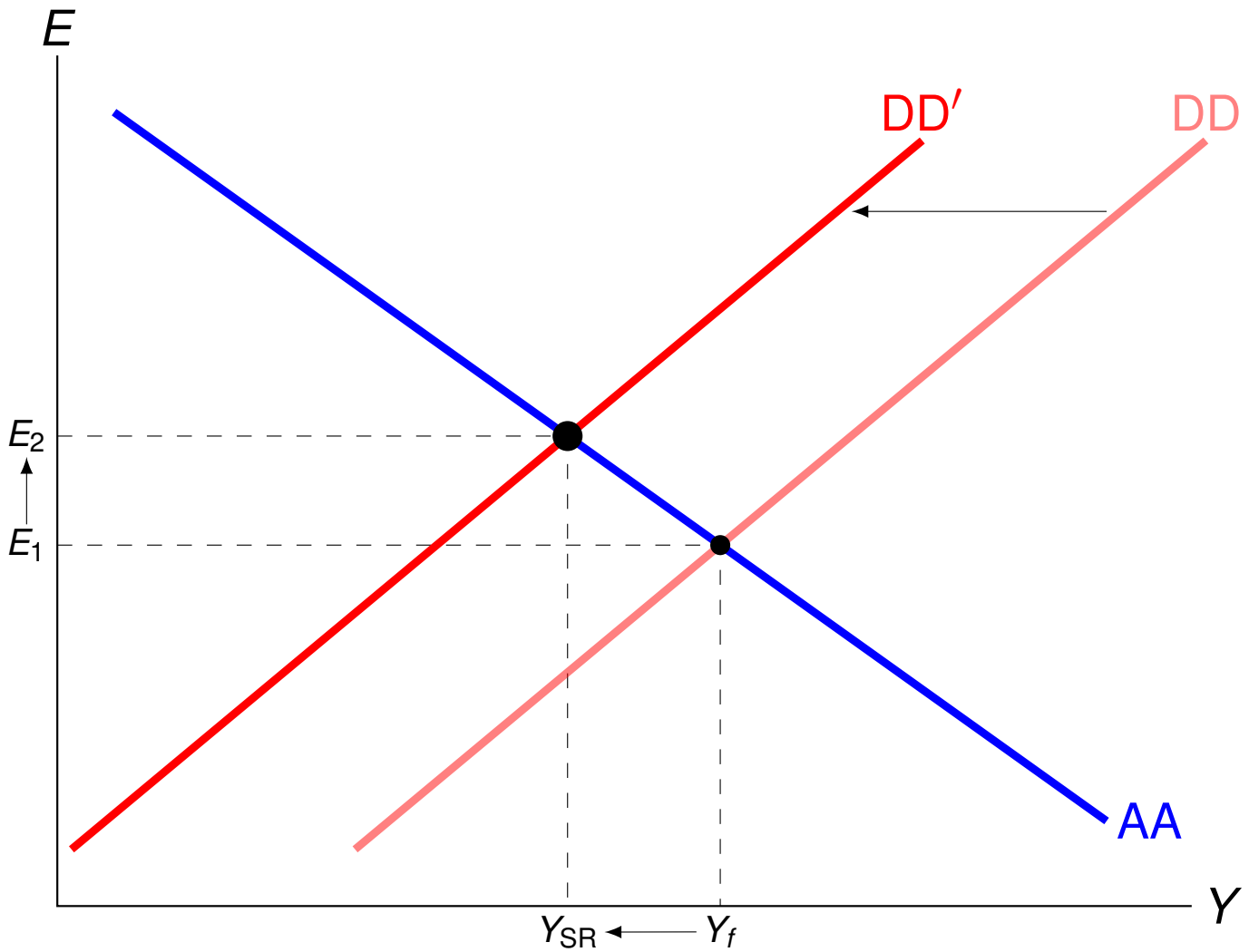
Under utilization:

- resources not used effectively, or
- resources are underemployed (e.g., high unemployment, few hours worked, idle equipment)
- $\rightarrow$ lower than normal production of goods and services.

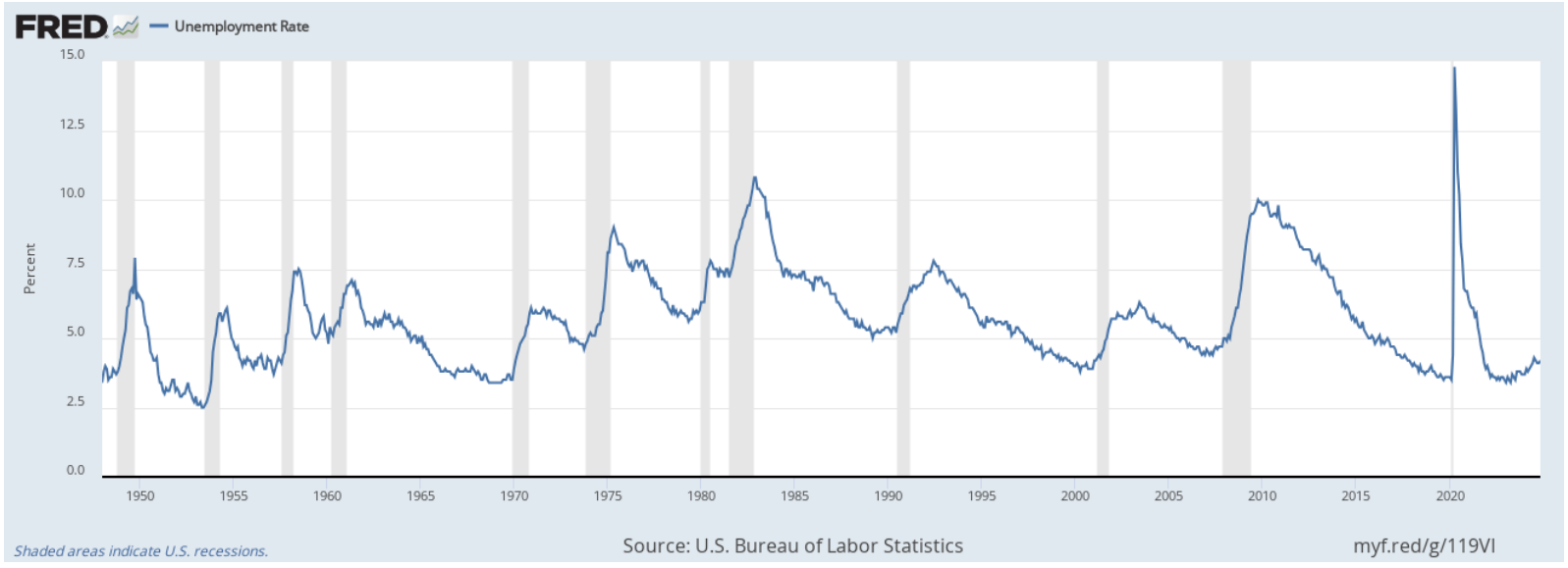
Over utilization:

- resources are not used sustainably
- resources are over-employed (e.g., unusually low unemployment, overtime hours, over-utilized equipment)
- $\rightarrow$ unsustainably high production of goods and services.

Temporary Fall in Aggregate Demand: SR Effects

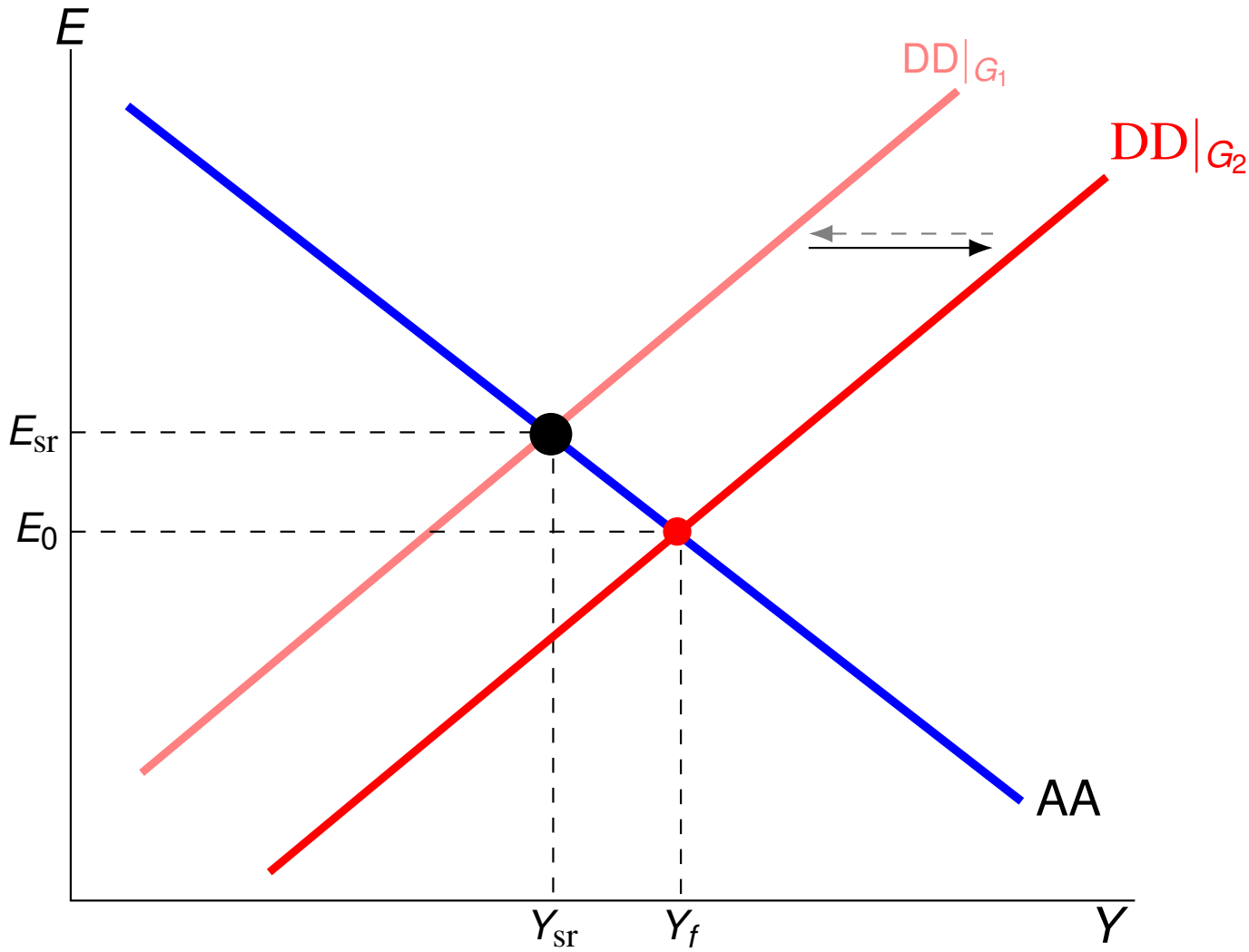


Monthly Unemployment (Seasonally Adjusted)



Source: https://fred.stlouisfed.org/series/UNRATE

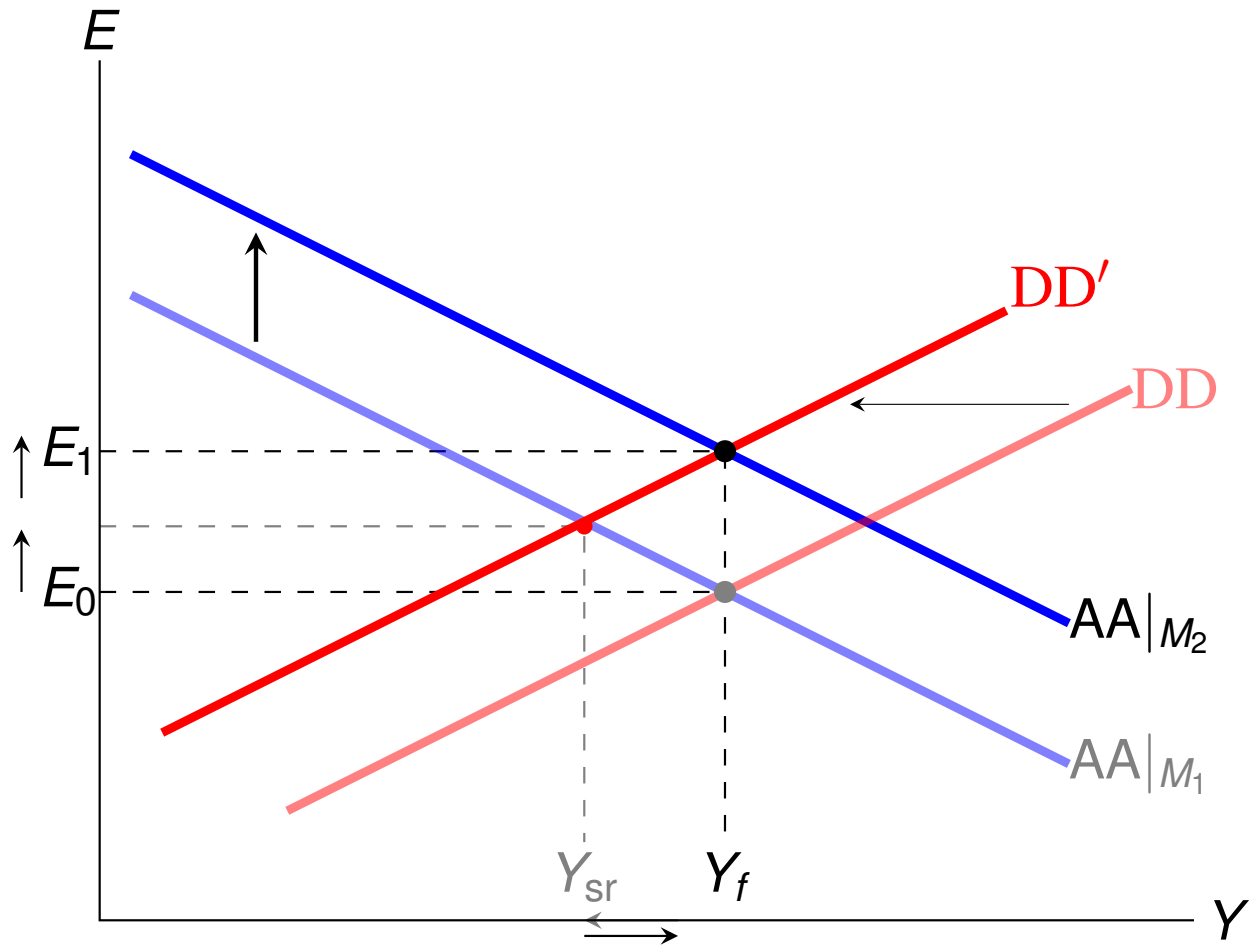
↑G as Policy Response to Temporary ↓D



Compare KOMIE Fig 17-12 (KOMIF Figure 6-12)

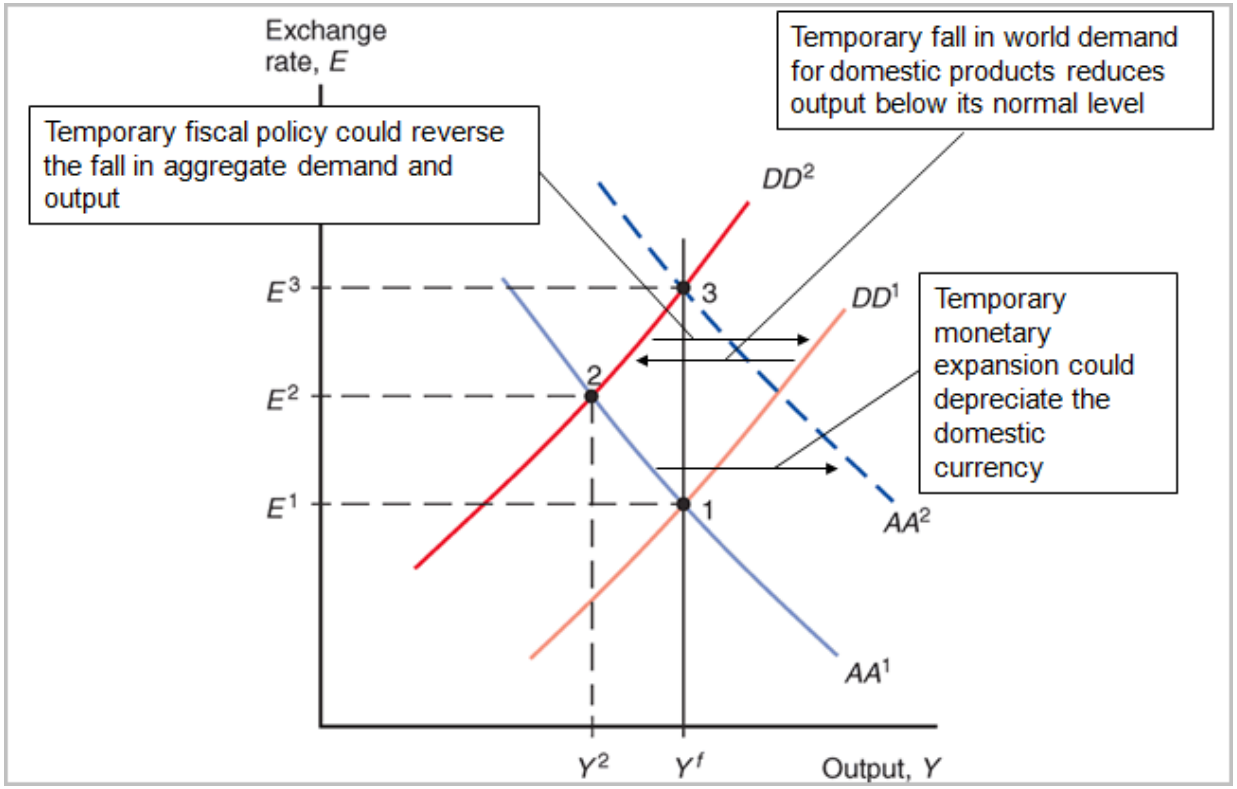
Compare: KOMIF Figure 6-12

↑M as Policy Response to Temporary ↓D



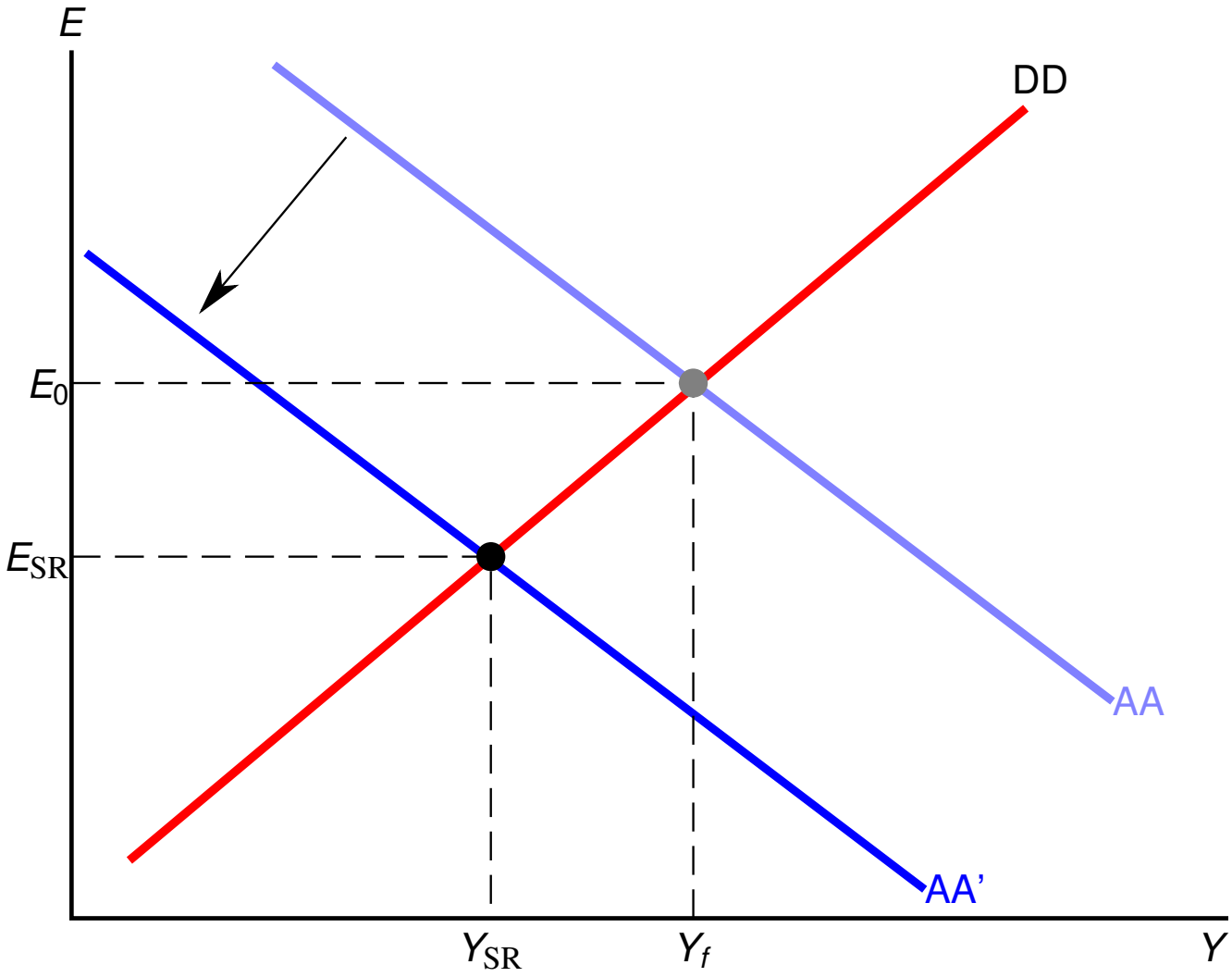
Compare KOMIE Fig 17-12 (KOMIF Figure 6-12)

Maintaining Full Employment After a Temporary Fall in World Demand for Domestic Products

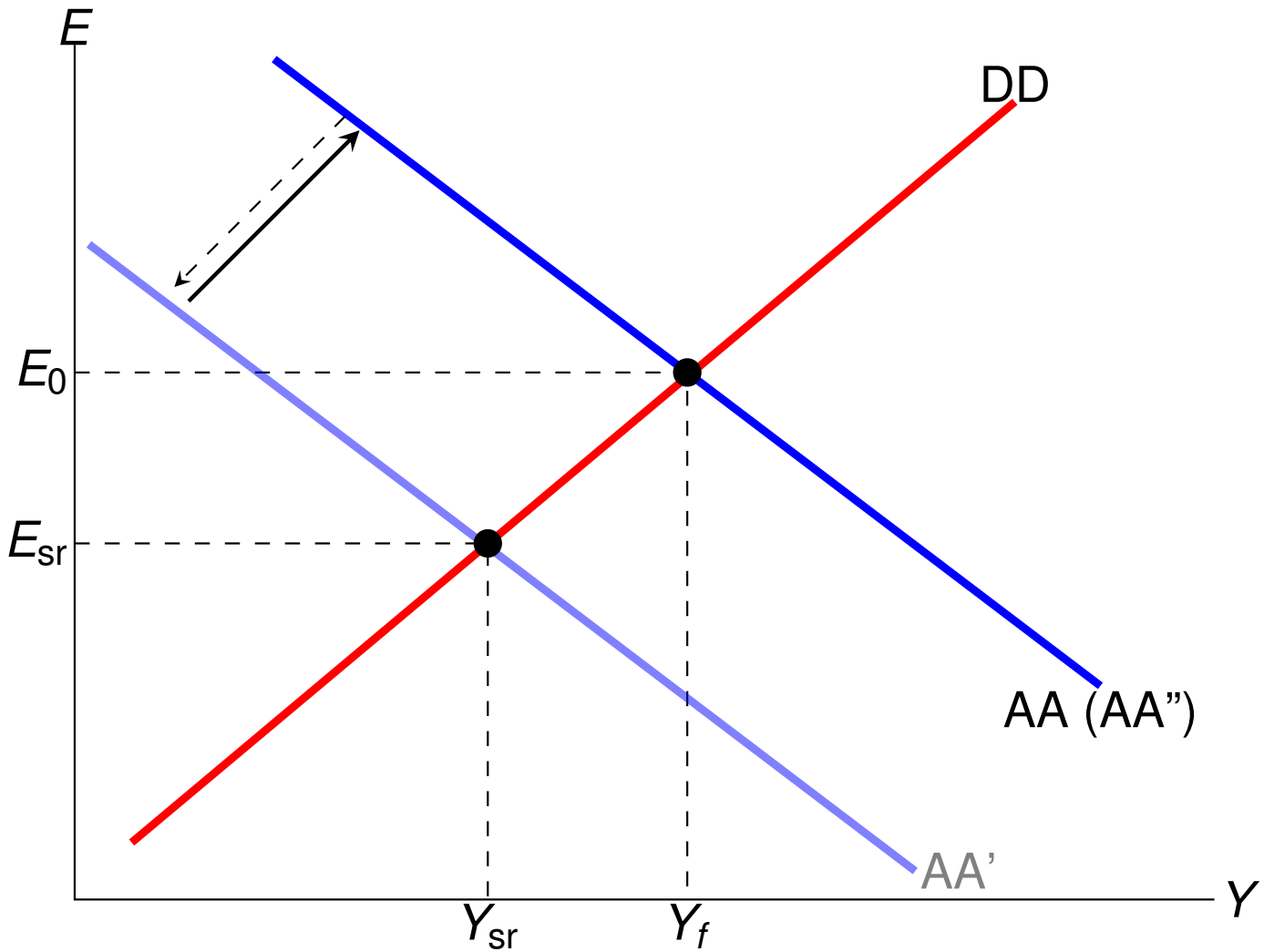


Source: KOMIE Figure 17-12 (KOMIF Figure 6-12); see textbook video.

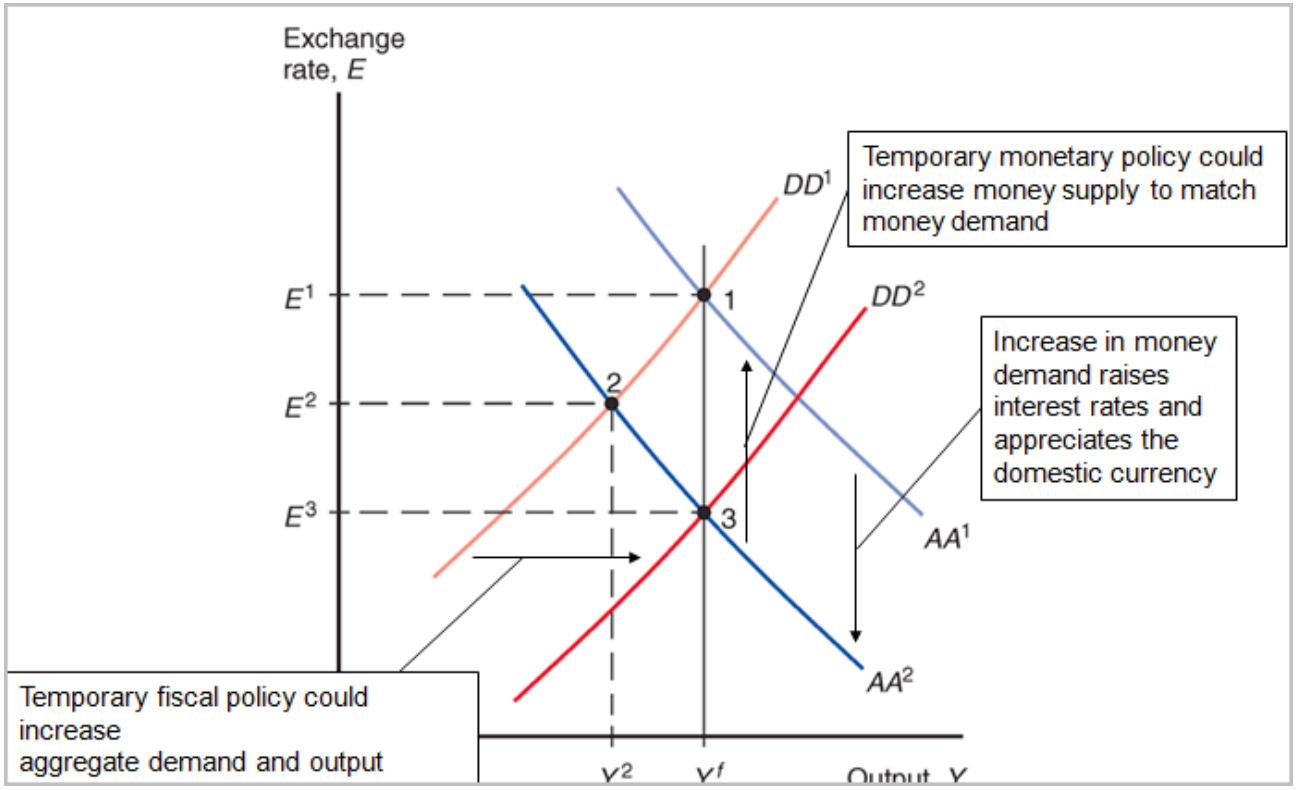
Temporary ↑L: SR Effects



↑M as Policy Response to Temporary ↑L: SR Effects



Policies to Maintain Full Employment After ↑L



Source: KOMIF Figure 6-13

Policies to Maintain Full Employment: Difficulties

Our model suggests it is easy to maintain full employment.
In practice, it is difficult.
Expansionary fiscal and monetary policies may induce inflation and higher inflation expectations, preventing high output and employment.
(Ignoring this leads to inflationary bias.)

Policies to Maintain Full Employment: Difficulties

Model assumptions:

- expectations *given*
  - but people may anticipate the effects of policy changes and modify their behavior.
- all prices sticky
  - workers may require higher wages if they expect overtime and easy employment
  - producers may raise prices if they expect higher wages and strong demand
- we know about the contractionary shock
  - but economic measurement is difficult and and economic data hard to understand.
  - policy makers must guess the state of the asset markets and aggregate demand; they make mistakes.

Policies to Maintain Full Employment: Difficulties

Model assumptions (continued):

- policy changes are implemented immediately and have immediate effects
  - but changes in policies take time to be implemented and to affect the economy.
  - expansionary policy may affect the economy after the the shock has dissipated.
- policy choices not influenced by political or bureaucratic interests
  - but policies may be influenced by political or bureaucratic interests.

Permanent Changes in Monetary and Fiscal Policy

"Permanent" shock: changes expectations about the future exchange rate

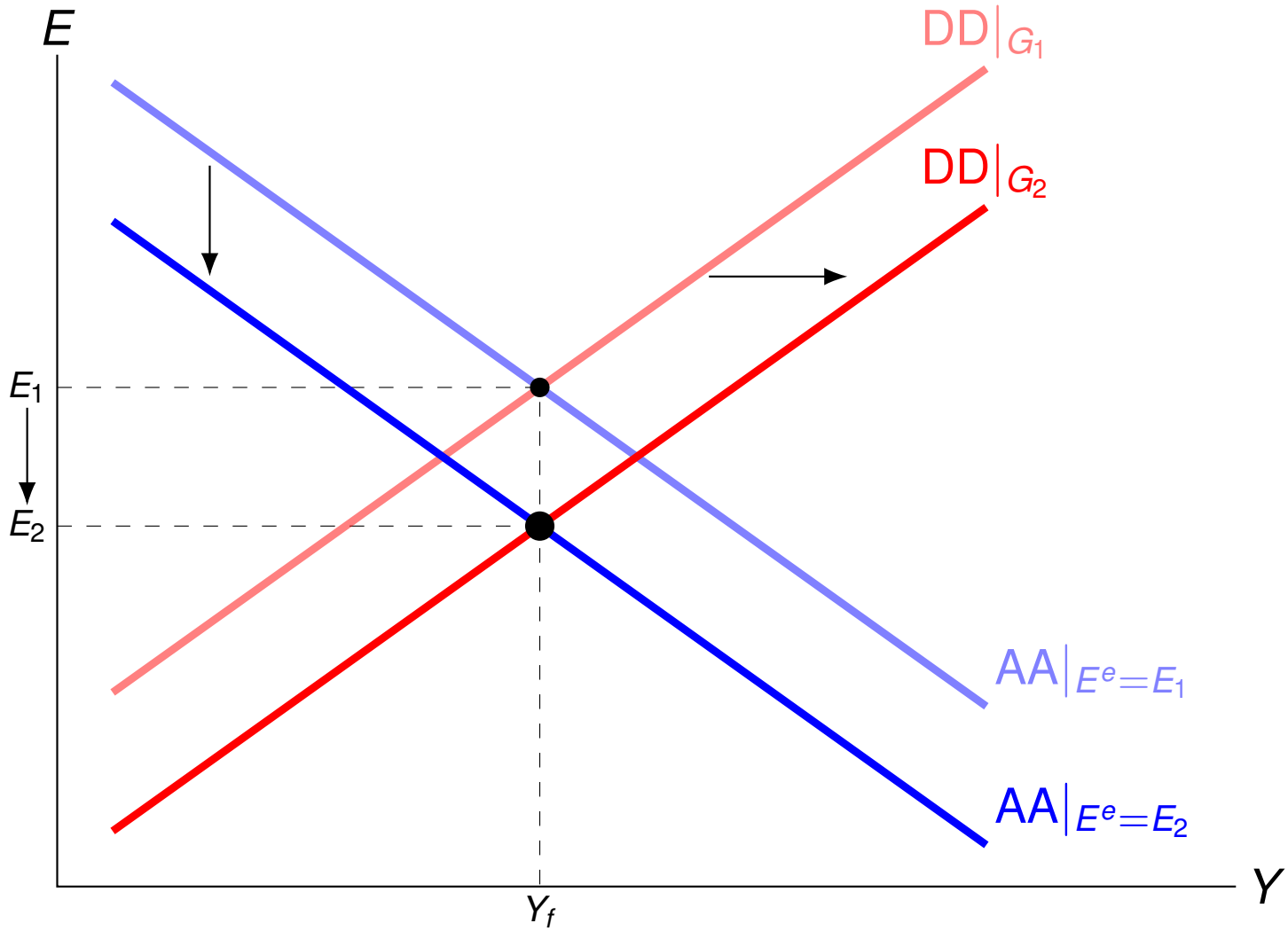
Permanent Fiscal Expansion

Permanent change in fiscal stance:

- increase in G or decrease in T
- Changes aggregate demand

Increases aggregate demand, subject to usual qualifications

Effects of a Permanent Fiscal Expansion

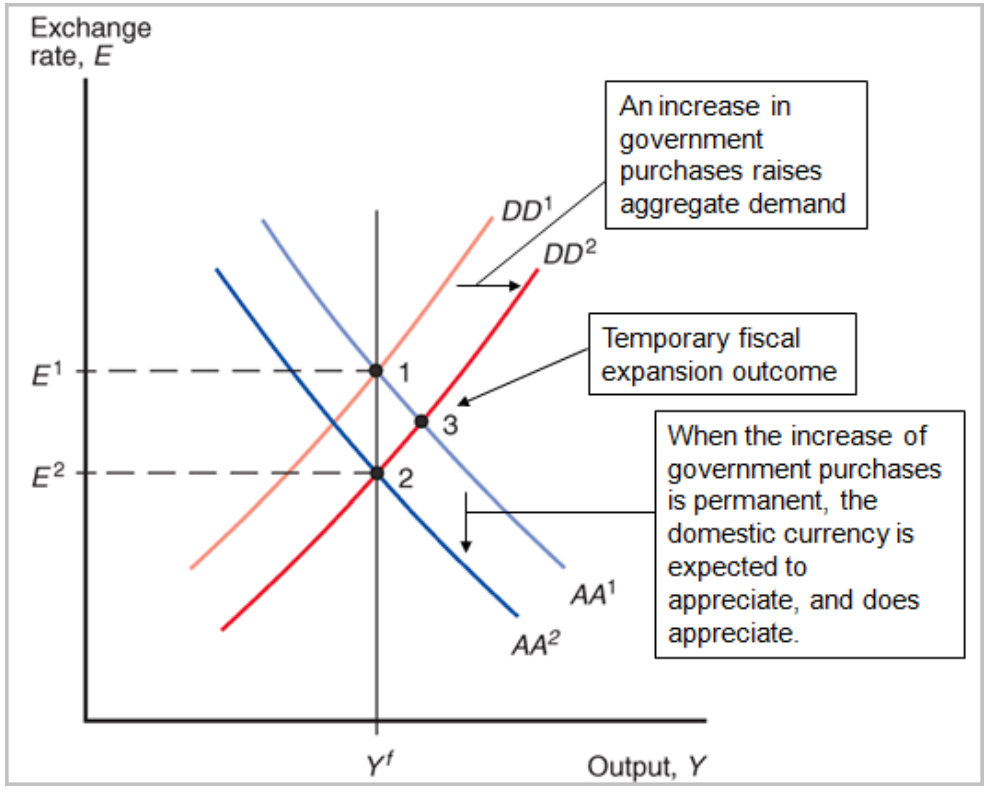


Note

$G_2 > G_1$

The DD curve still shifts, but the AA curve also shifts, so a **permanent**

Fig. 16-16: Effects of a Permanent Fiscal Expansion



Source: KOMIF Figure 6-16

Permanent Fiscal Expansion

SR effects of permanent increase in G:

- increase in G increases demand and so increases Y
- decrease in E decreases demand and so decreases Y

Remember, it is a SR model, so prices are sticky.
There is no net increase in demand.

- How much does E appreciate?
- Enough to restore D=Yf
  - (to see, think LR)
- Note: E appreciates -> real E appreciates
- E^e appreciates (permanent shock)

Permanent Fiscal Expansion (LR)

Interestingly, for a permanent fiscal expansion, the LR outcomes and SR outcomes are the same!

- $M = M_0$, $Y = Y^f$, $R = R^*$
- so P is unchanged!
- But then $D[EP^*/P, Y - T, I, G) = Y^f$
- $\rightarrow \uparrow$G must "crowd out" private demand through CA!

Twin deficits once again

Permanent ↑tariffs

Proposals

Donald Trump proposes to reduce US reliance on income taxes while increasing our reliance on import tariffs.

- extending expiring tax cuts from 2017
- new rounds of tax cuts.
- 10% "across-the-board" tariff and a 60 percent or more tariff on imports from China.

Together, these policy steps would amount to regressive tax cuts, only partially paid for by regressive tax increases.

Real Exchange Rate Redux

Assume no retaliation!

US importers pay the tariff at rate τ, so the relative cost of foreign goods becomes

$$E\frac{(1+\tau)P^*}{P}$$

Effect on CPI:

- higher costs of imports $\rightarrow$ higher CPI
- demand shift toward domestic goods $\rightarrow$ higher domestic prices $\rightarrow$ higher CPI

Estimated Cost to Consumers

Expected Cost

- A consistent theoretical and empirical finding in economics is that domestic consumers and domestic firms bear the burden of a tariff, not the foreign country.
- The Trump tariffs are estimated to
  - reduce after-tax incomes by 3.5 percent for those in the bottom half of the income distribution
  - cost a typical median-income household about $1,700 in increased taxes each year.

Effects on Aggregate Supply and Demand

Assume no retaliation:

- substitution: $\uparrow$ demand for domestic production $\rightarrow \uparrow$ AD
- input complementarity: $\downarrow$ demand for domestic production $\rightarrow \downarrow$ AD
- $\uparrow$ costs of foreign inputs and intermediate good $\rightarrow \downarrow$ AS

In the SR, ambiguous effects.

In the LR, AS effects dominate.

Retaliation can negate the positive demand effect.

Current context: GDP Now (Atlanta Fed)

Quantitative Easing (QE) and Quantitative Tightening (QT)

Quantitative Easing

Quantitative Easing (QE):

- policy to expand the high-powered money supply even when SR interest rates are unresponsive (e.g., already near zero)
- especially: substantial expansion of bank reserves (and thus the monetary authority's balance sheet)
- goals: ease credit; lower long bond rates; affect expectations
- term often used to include "qualitative easing" or "credit easing"

Credit easing:

- monetary authority attempts to influence credit conditions by manipulating the *composition* of its balance sheet
- targets non-traditional assets, especially less liquid and riskier securities (including mortgage-backed securities, longer term Treasury issue)
- does *not* just target bank reserves

US Easing

QE 1 (from Nov 2008):

Fed starts acquiring mortgage backed securities (MBSs).

QE 2 (from Nov 2010):

- popular name for a second round of credit easing, especially as initiated in the US in November 2010
- Federal Reserve committed to purchase an additional $600B in longer-term Treasuries by mid-2011, acquiring about $75B per month

QE 3 (from Sep 2012):

- $40B-85B per month purchases of agency MBSs

QE 4 (from Mar 2020):

- another $700B in asset purchases

Permanent Changes in Monetary Policy

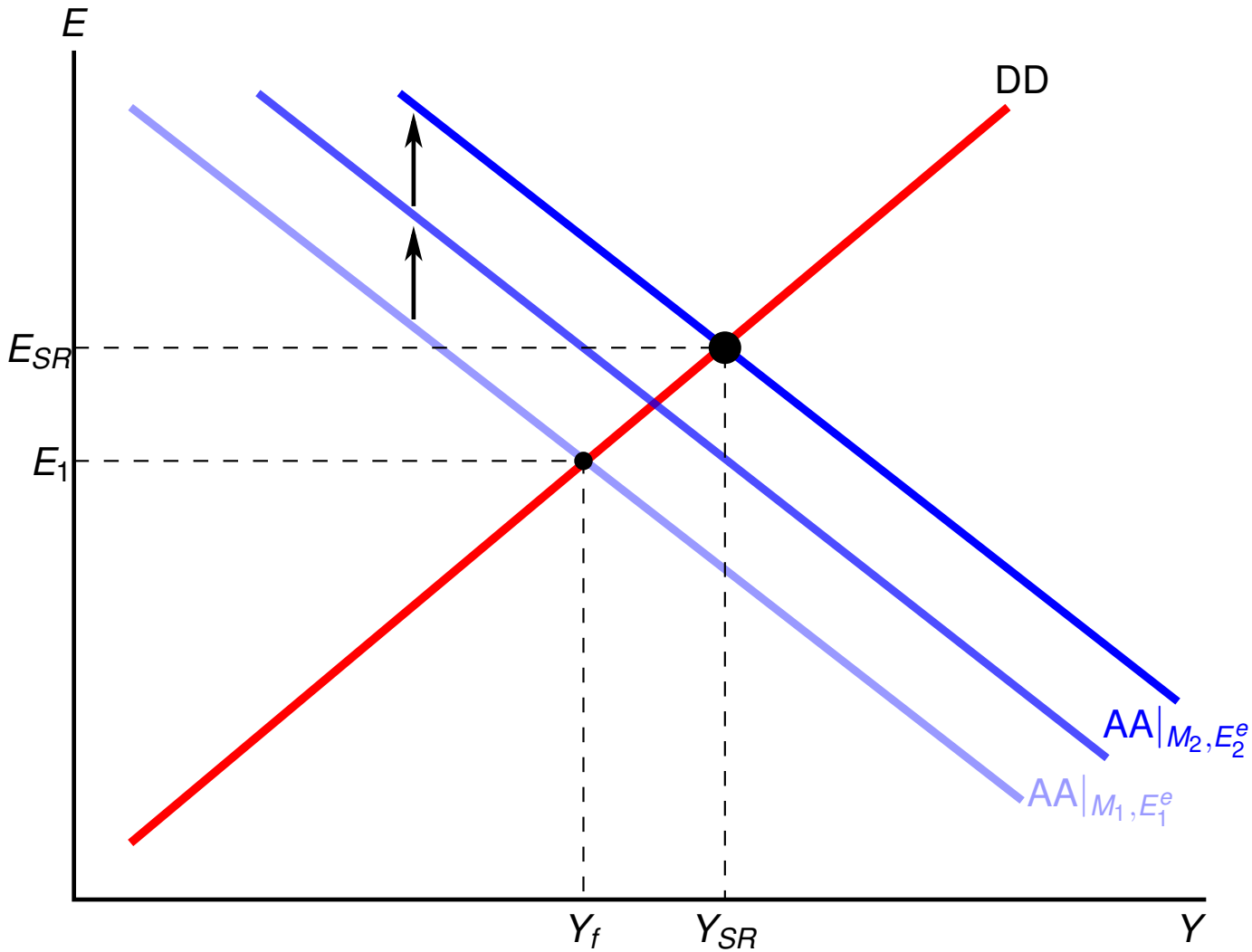
Permanent ↑M:

1. makes people expect future depreciation of the domestic currency (increases the expected rate of return on foreign currency deposits at each E)
2. causes ↑M/P and ↓R (in the short run)

Two forces for depreciation combine:

- in the assets markets, E rises *more* than when expectations are constant (see our static expectations results).
- ∴ the AA curve shifts up *more* than the case when expectations are held constant.

Permanent ↑M → ↑Ee and ↓R (in SR).



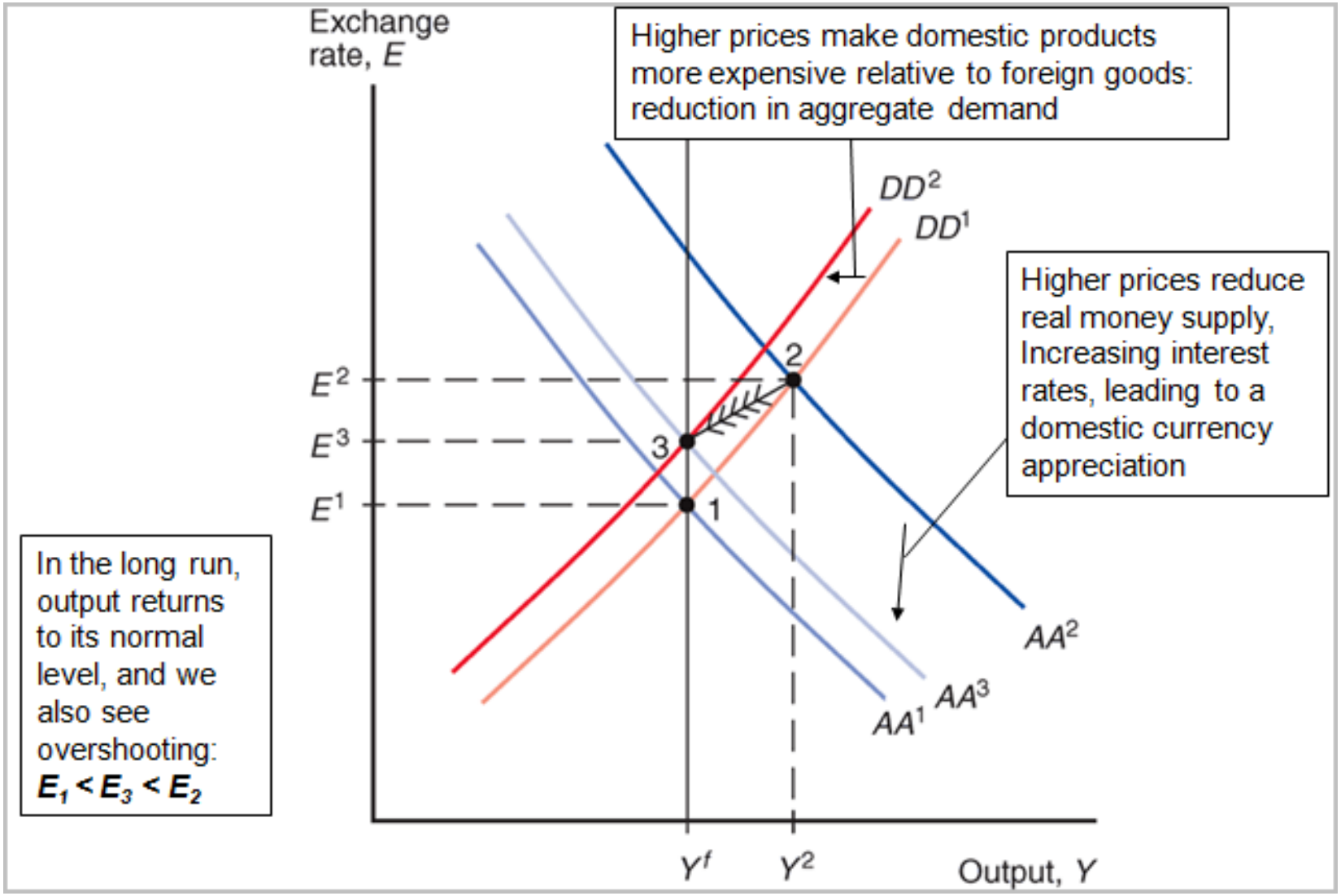
Compare: KOMIF Figure 6-14

Note: $M_2 > M_1$; $E_2^e > E_1^e$

Effects of Permanent Changes in Monetary Policy in the Long Run

- With employment and hours above their normal levels, there is a tendency for wages to rise over time.
- With strong demand of goods and services and with increasing wages, producers have an incentive to raise prices over time.
- Both higher wages and higher output prices are reflected in a higher level of average prices.
- What are the effects of rising prices?

Long-Run Adjustment to a Permanent Increase in the Money Supply



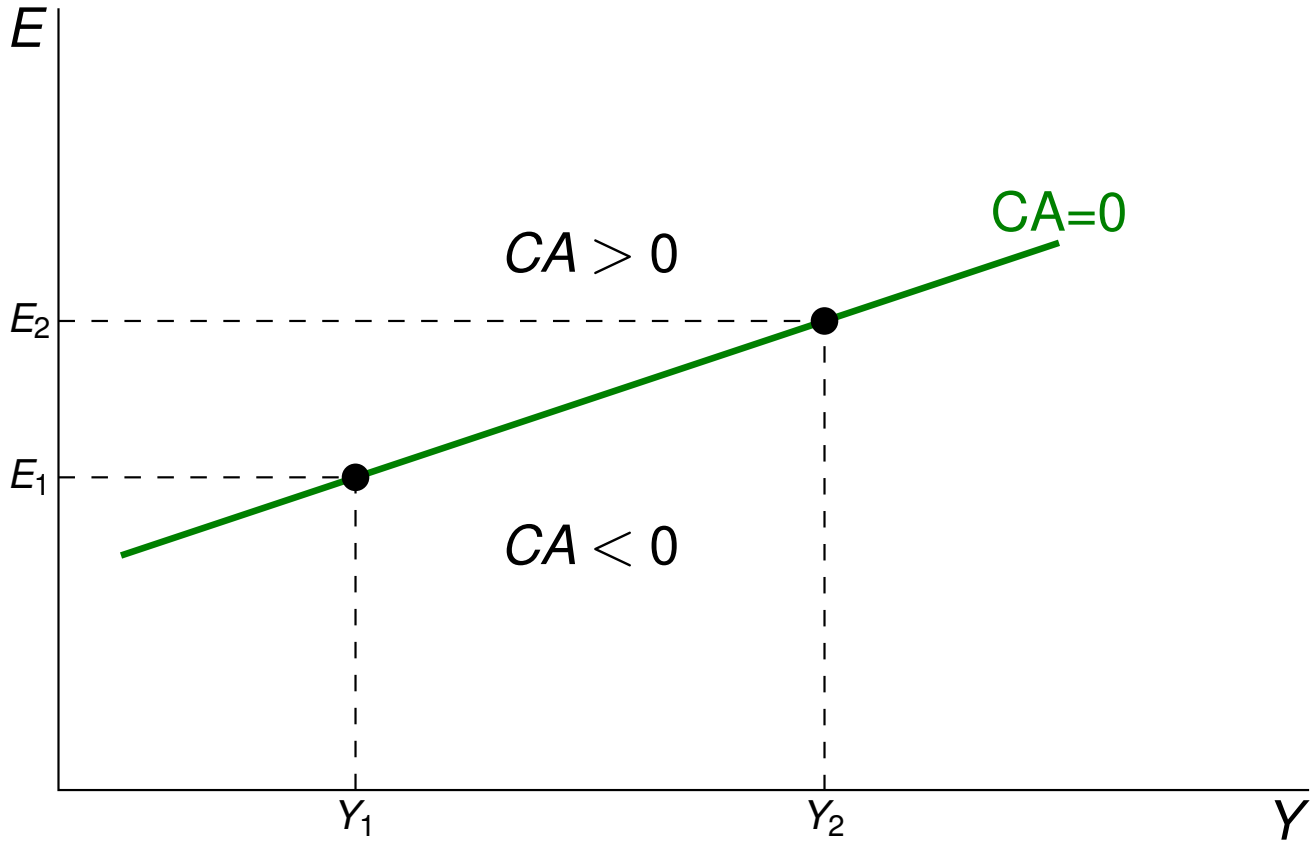
Source: KOMIF Figure 6-15

Macro Policy and CA

XX curve:

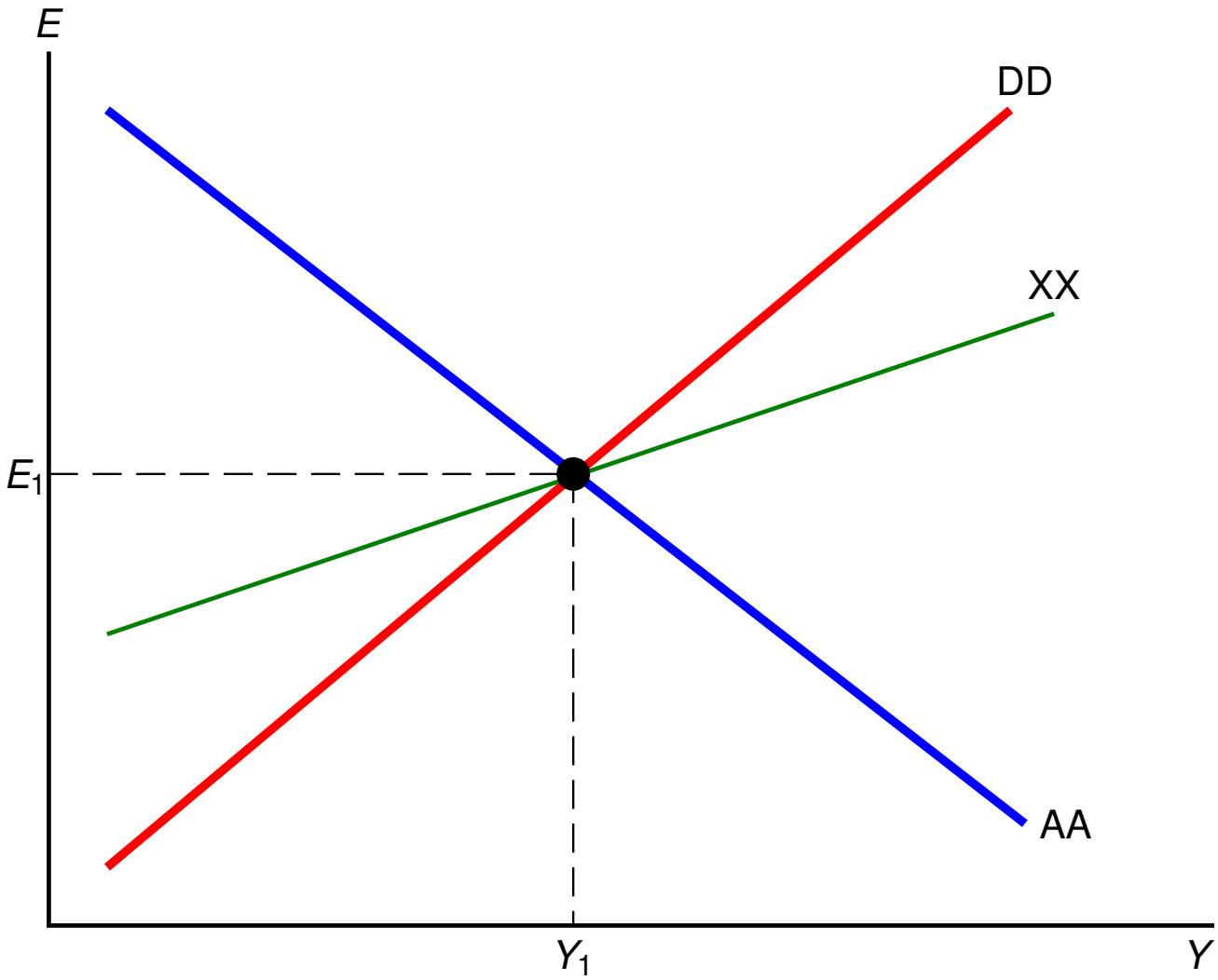
- (Y,E) combinations for a **constant** CA
- E.g., CA is constant at its desired level X
- To keep CA constant, ↑Y must be offset by ↑E: the XX curve slopes upward.
  - As Y increases, the current account declines, cet. par.
  - As E increases, the current account improves, cet. par.

Macroeconomic Policy and the Current Account



$$CA[\overbrace{EP^*/P}^{+}, \overbrace{Y-T}^{-}]$$

AA, DD, and XX



Note: Compare KOMIE 12 Fig 17-7.

Why XX is Flatter than DD

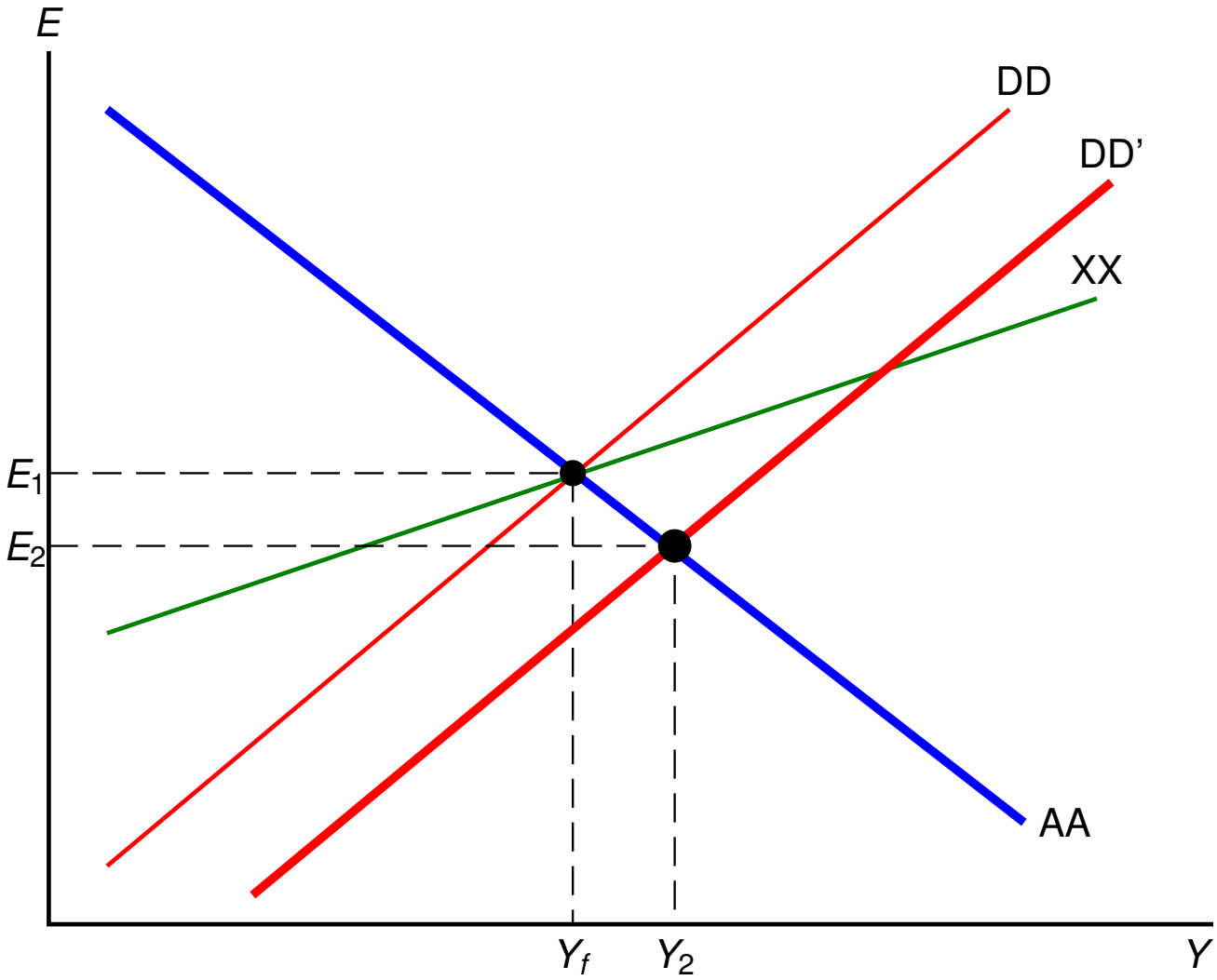
- To keep the current account constant, the domestic currency must depreciate as income and output increase
  - the XX curve slopes upward.
- To keep the goods market in equilibrium, domestic income must rise as our currency depreciates
  - the DD curve slopes upward.
- Which is flatter?
  - Start with CA = X
  - Raise E and Y so that CA=X (still on XX)
  - No change in AD via CA, but up AD and AS due to up Y, -> excess supply
- so DD is above XX

Macroeconomic Policies and the Current Account (cont.)

Policies affect the current account through their influence on the value of the domestic currency.

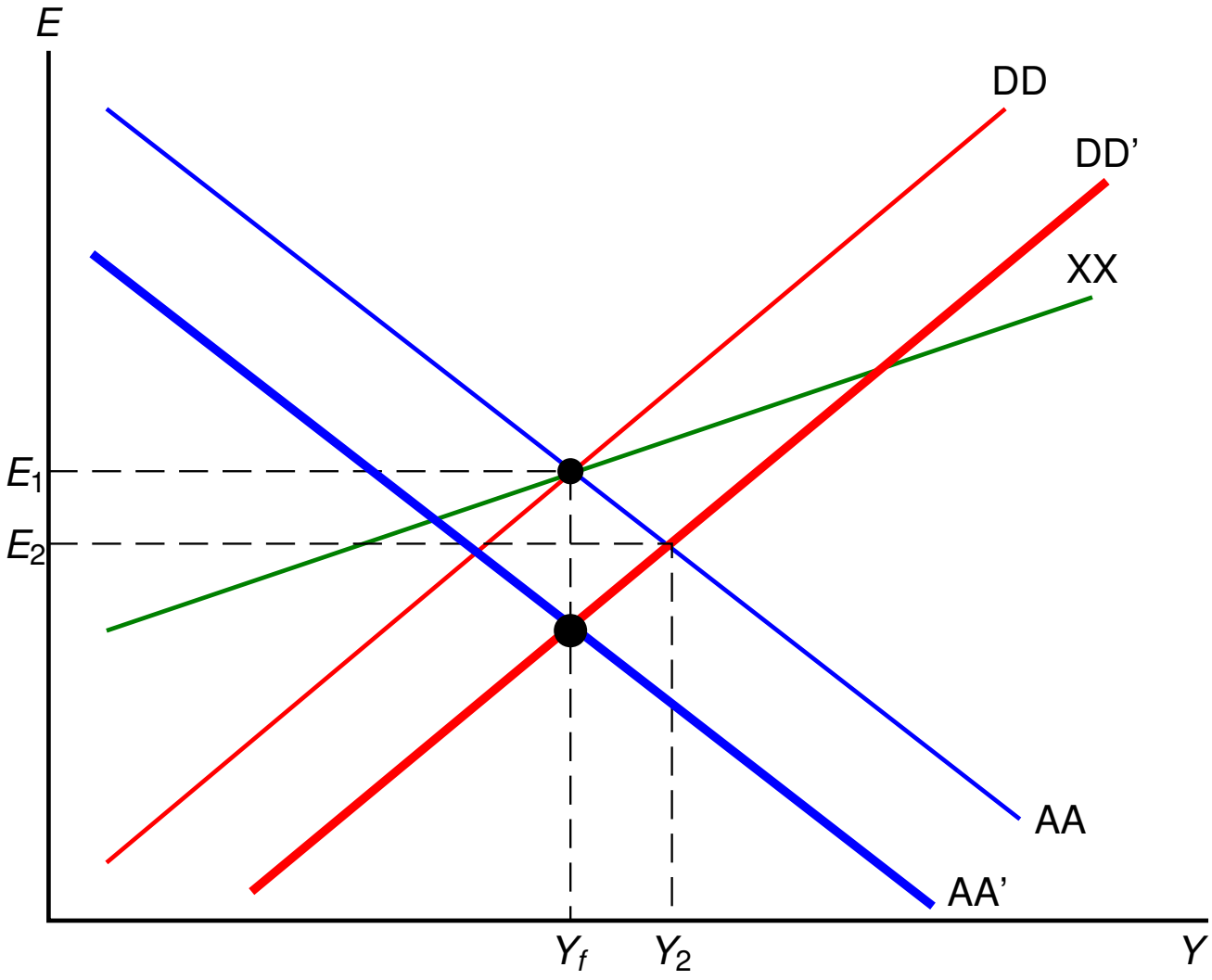
- An increase in the quantity of monetary assets supplied depreciates the domestic currency and often increases the current account in the short run.
- An increase in government purchases or decrease in taxes appreciates the domestic currency and often decreases the current account in the short run.

Temporary Fiscal Expansion and the Current Account



temporary fiscal expansion $\rightarrow$ DD shifts right $\rightarrow \downarrow$E $\rightarrow \downarrow$CA

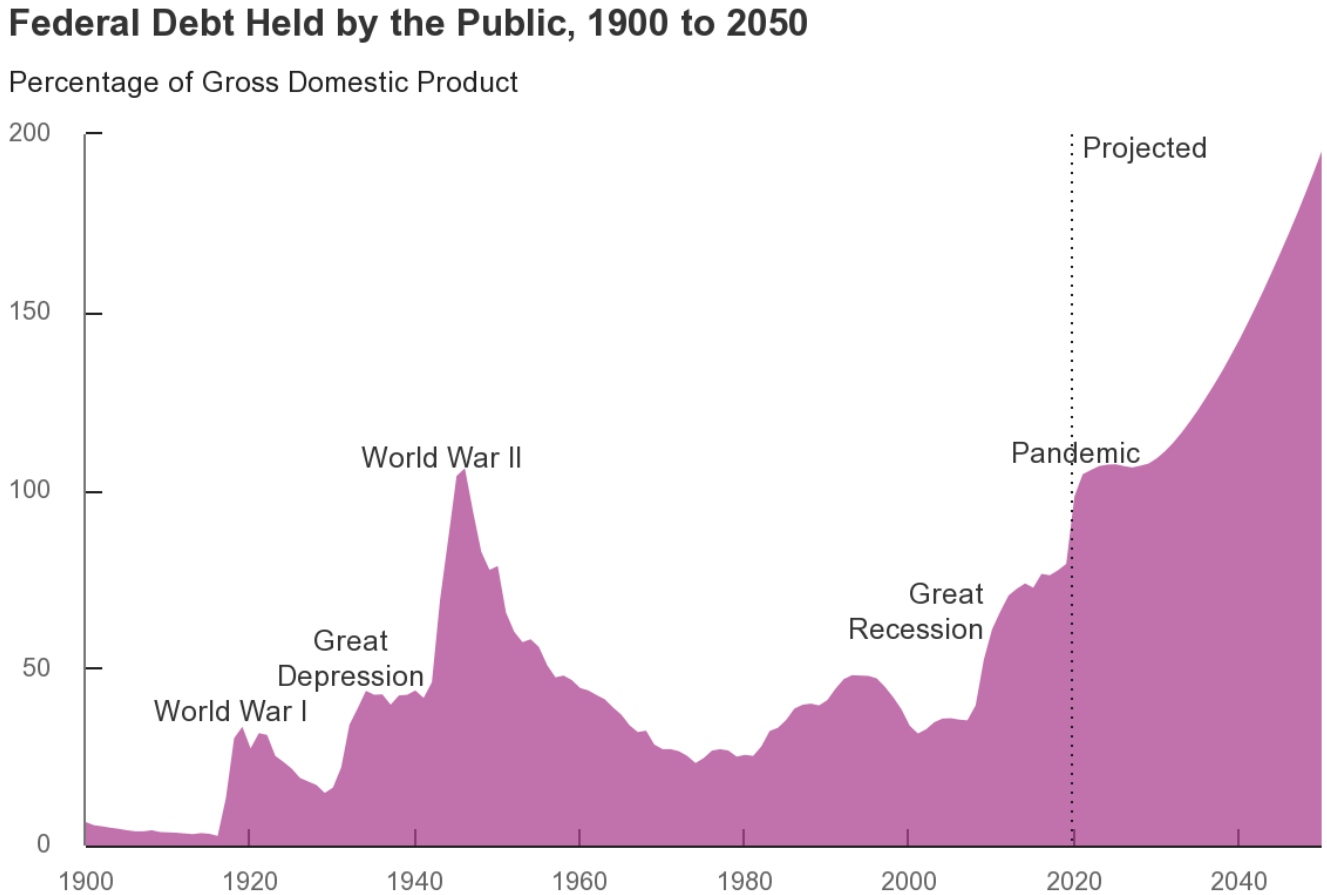
Permanent Fiscal Expansion and the Current Account



The AA curve also shifts: a **permanent** fiscal expansion decreases CA more.

Another Fiscal Consequence

US: Debt and Debt/GDP



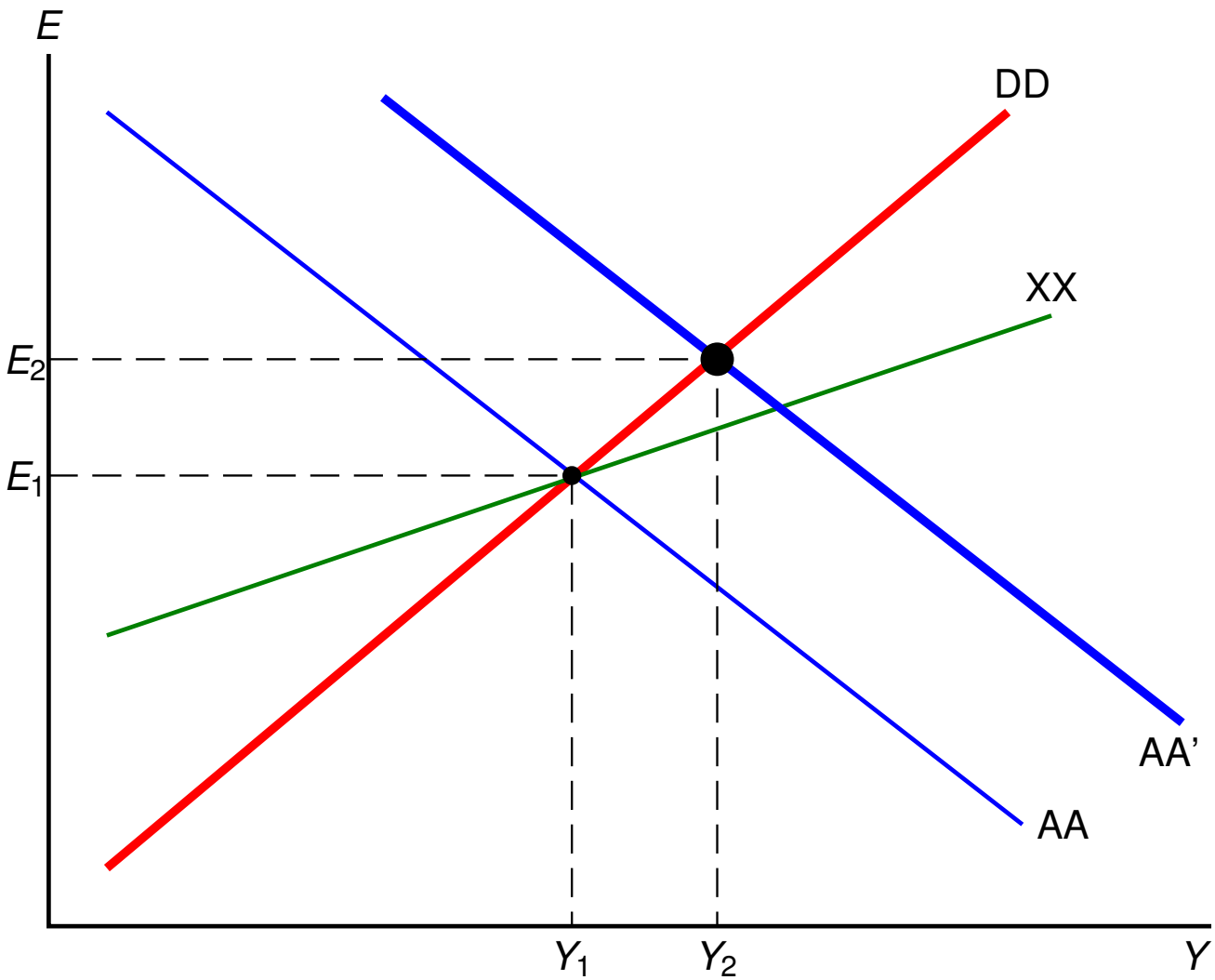
Source: https://www.cbo.gov/publication/56516

$\uparrow M \rightarrow \uparrow CA$

Increase in the money supply

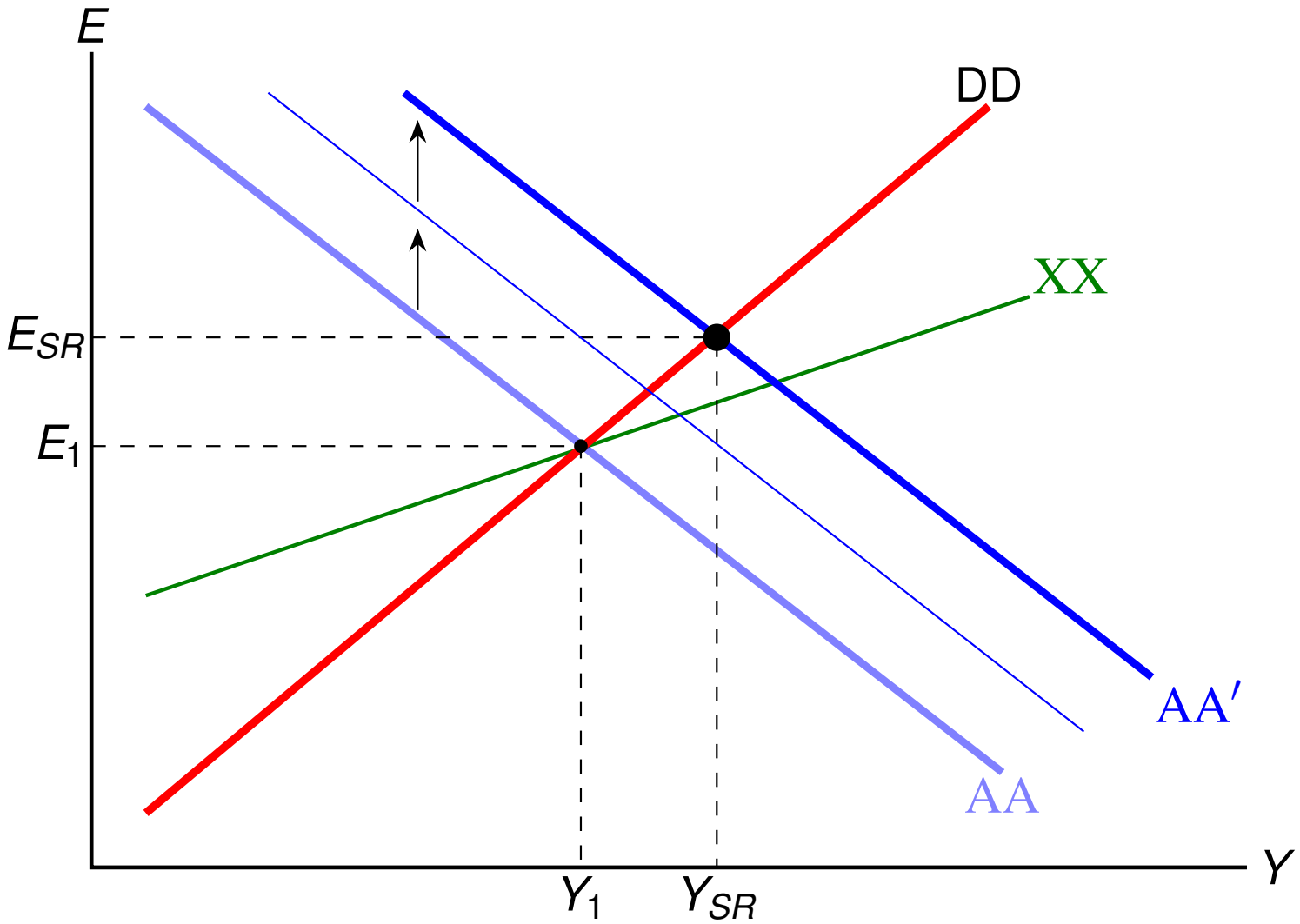
- shifts up the AA curve
- causes a *movement along* the DD curve, which is steeper than XX
- $\rightarrow$ depreciates the domestic currency
- $\rightarrow \uparrow CA$

Temporary Monetary Expansion and the Current Account



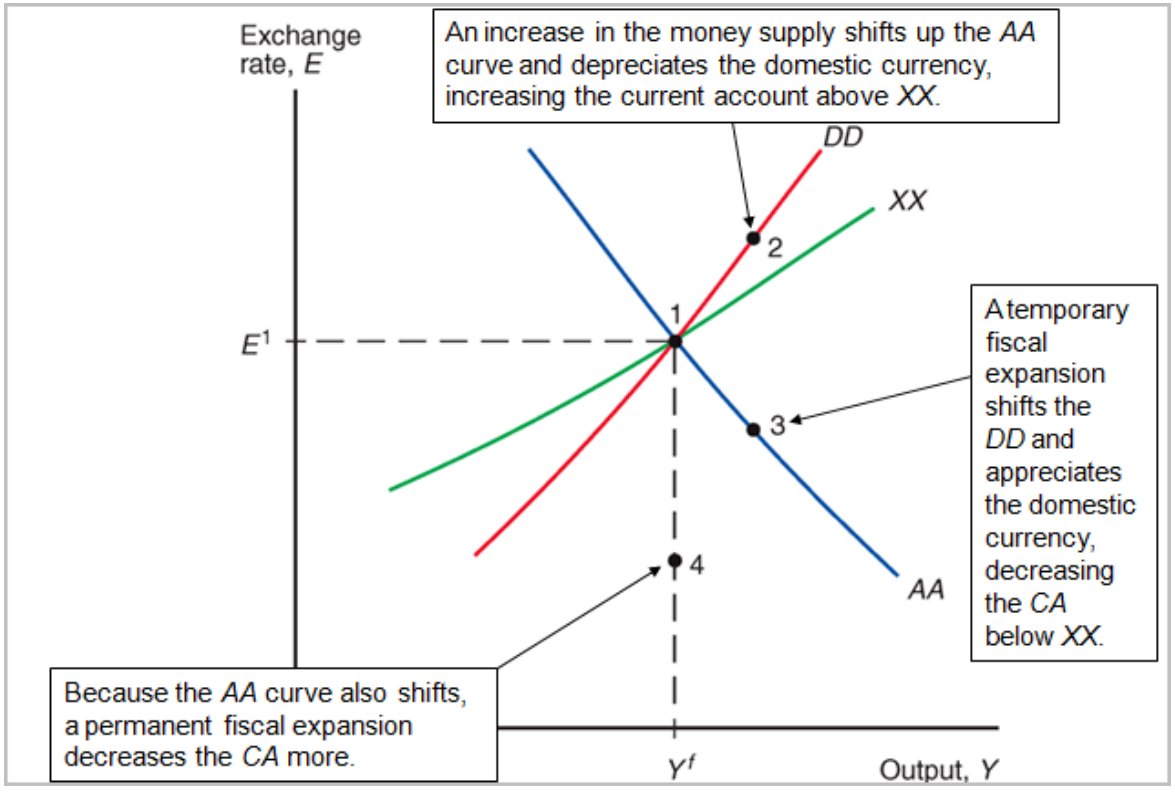
Compare KOMIE 17-10 (KOMIF 6-10)

Permanent Monetary Expansion: SR Effects



Compare KOMIE 17-14 (KOMIF 6-14)

Summary: Macroeconomic Policy and the Current Account



Source: KOM Figure 17-17b

Real Depreciation and the Current Account: More Details

CA = EX - IM the value of exports relative to the value of imports

Real depreciation: a rise in q (i.e., $\uparrow$ EP*/P) prices of foreign products rise relative to the prices of domestic products.

- The volume of exports that are bought by foreigners rises.
- The volume of imports that are bought by domestic residents falls.
- The value of any given amount of imports in terms of domestic products rises (i.e., the relative price of imports rises, foreign products becomes relatively expensive)

Marshall-Lerner Condition

Real current account:

- measured in domestic goods
- conflicting volume and valuation effects
- CA = EX - IM = EX - q Im

Marshall-Lerner Condition

- condition for $\uparrow$q $\rightarrow$ $\uparrow$CA
- volume effects outweigh value effect
- need sum of export and import elasticities > 1

$$\varepsilon_X + \varepsilon_M > 1$$

SR Effect of Depreciation: Value Effects and Volume Effects

SR volume effects

- volume of imports and exports is relatively fixed in SR

value effects

- sticky prices: P and P^* relatively fixed in the short run
- pass through: $\uparrow E \rightarrow \uparrow (EP^*)$ (imports cost more)
- $\uparrow (EP^*/P)$

SR net effect

- domestic currency value of exports does not change.
- domestic currency value of imports rises
- $\downarrow$CA

Depreciation and the Current Account: Elasticity Dynamics

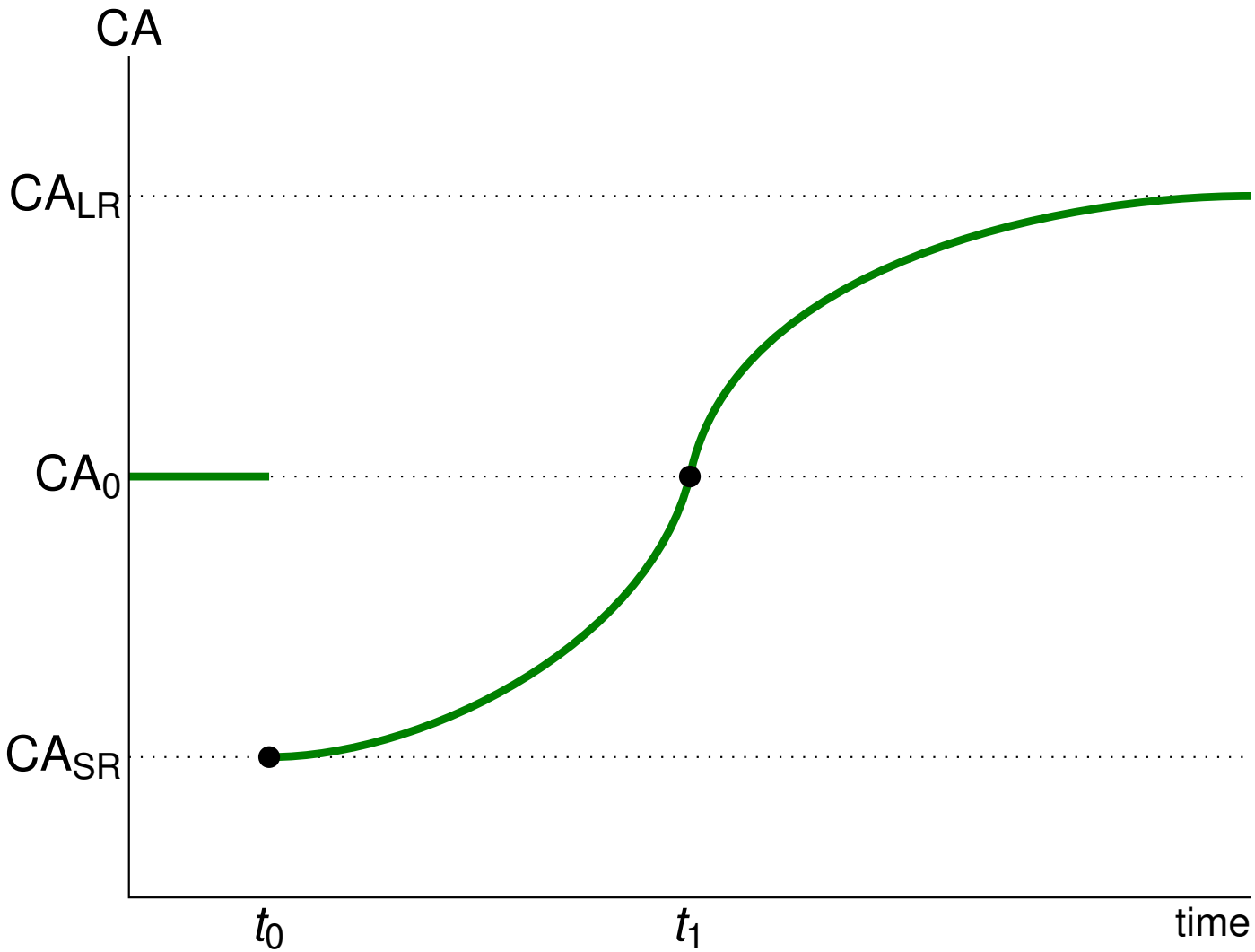
SR net effect:

- Initally volumes of imports and exports change little.
- Example: contract obligations to buy fixed amounts of products.
- $\therefore$ value effect may dominate the volume effect when the real exchange rate changes.

Medium term net effect:

- Volumes gradually respond $\rightarrow$ the volume effect overcomes the value effect (eventually).
- Evidence: in most countries, the volume effect dominates the value effect after one year or less.

Depreciation and the Current Account: The J-Curve



Compare KOMIE 12 Fig 17-18.

Liquidity Trap

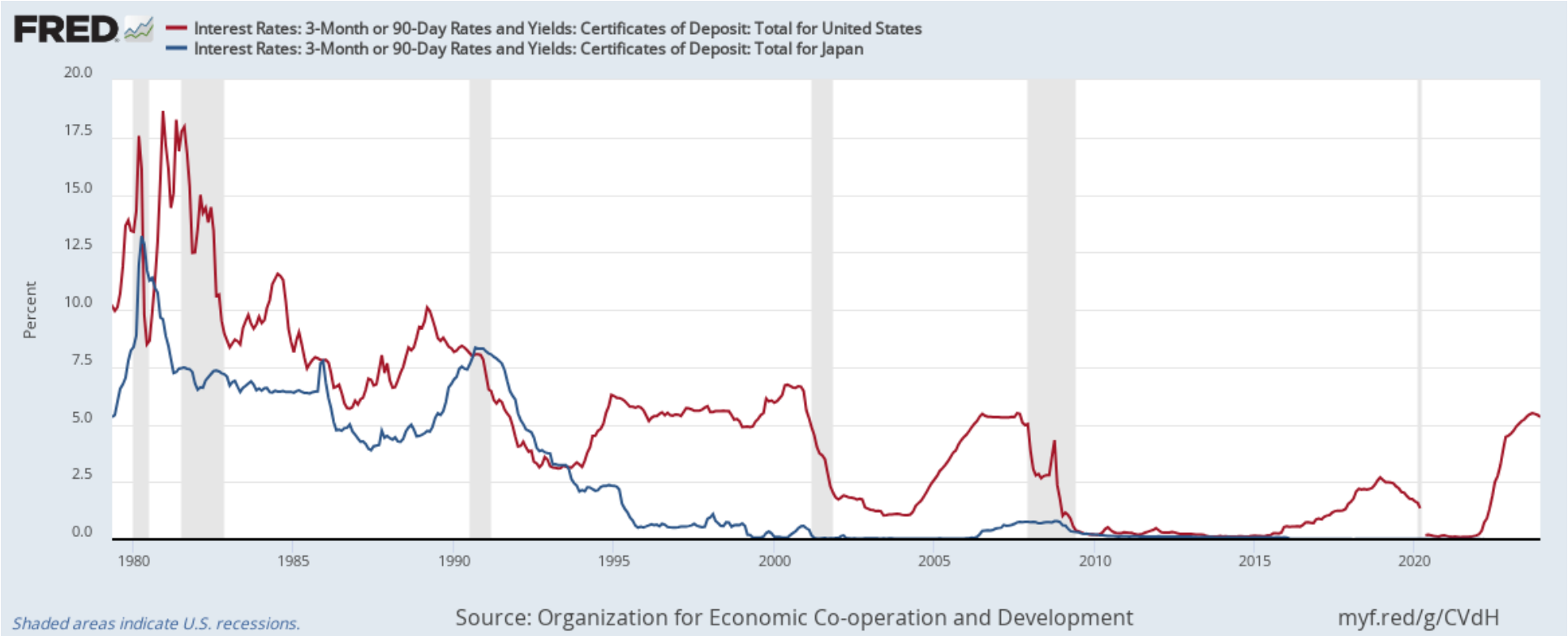
A liquidity trap occurs when nominal interest rates fall so low that the central bank can no longer push them lower.

Interest Rates, Exchange Rates and a Liquidity Trap

Traditionally, economists considered there to be a zero lower bound (ZLB) to the interest rate.

- Very roughly speaking, when nominal interest rates fall to zero, people are indifferent between holding monetary and interest-bearing assets,
- Pushing rates lower is hard, because depositors would have to pay to put their money in banks.
- However, holding large amounts of cash may be risky.

Three-Month Interest Rates on Dollar and Yen Deposits



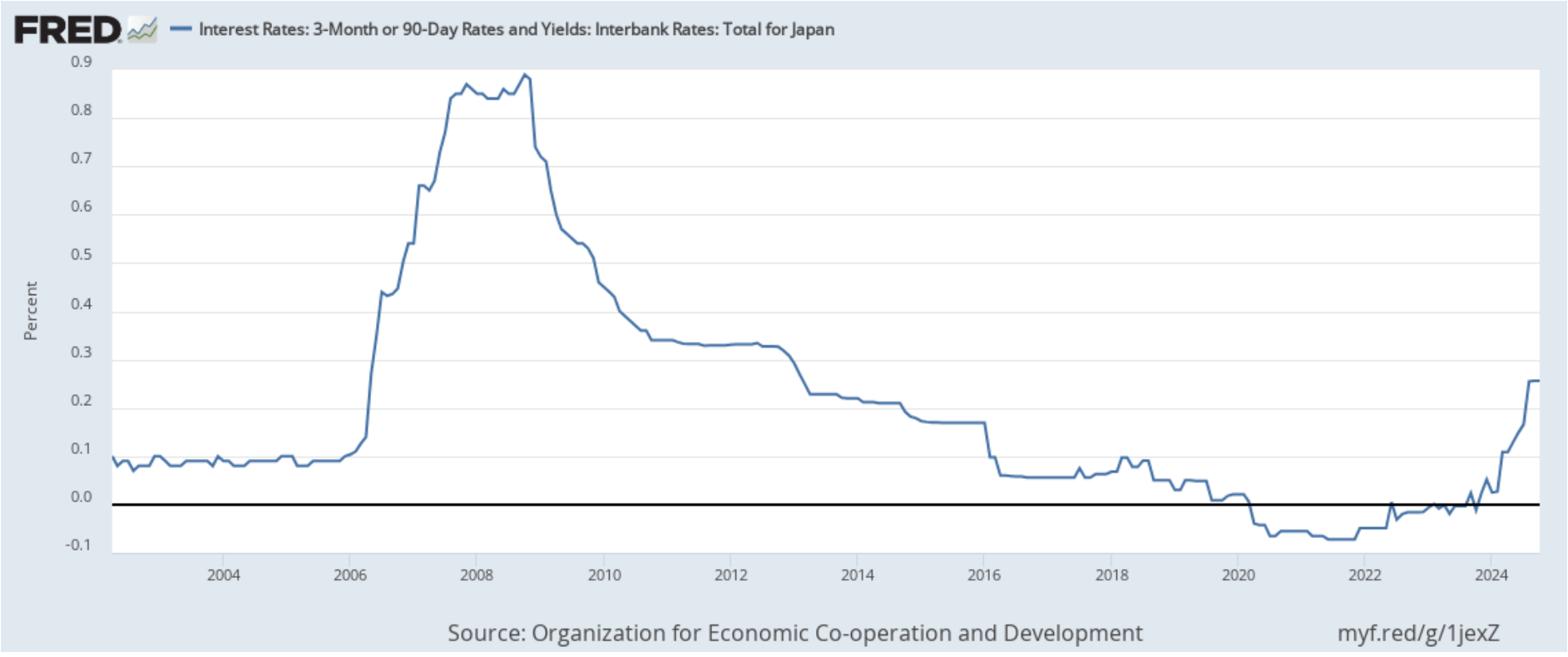
Source: https://fred.stlouisfed.org/graph/fredgraph.png?g=CVdH

Compare: KOMIF Fig 3-2

Japan and the ZLB

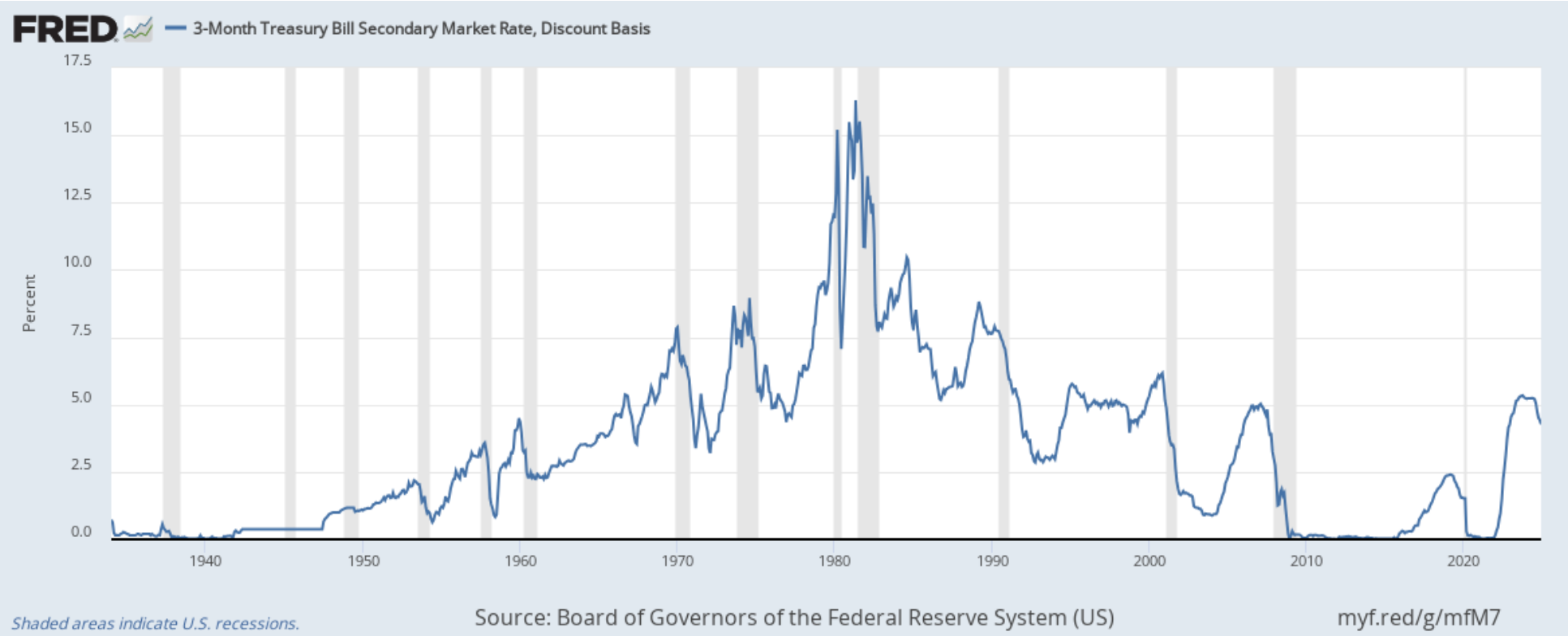
For most of the 20th century, the ZLB was mostly treated as a curiosity.
Then in the late 1990s, Japan seemed to hit the limits of monetary policy.
More recently, economists have started talking about an *effective* lower bound (ELB), somewhere (perhaps even 1% or 2%) below zero!

Japan: 90-Day Interbank Rates



Source: https://fred.stlouisfed.org/series/IR3TIB01JPM156N

US: Three-Month T-Bill Rates



Source: https://fred.stlouisfed.org/series/TB3MS

Interest Rates and Exchange Rates under Interest Parity

Recall that uncovered interest parity determines a relationship between E and R.

$$R = \underbrace{R^* + (E^e - E)/E}_{\text{DRED}}$$

$$1 + R - R^* = E^e/E$$

$$E = E^e/(1 + R - R^*)$$

Interest Rates, Exchange Rates and a Liquidity Trap

Suppose the domestic interest rate is at its effective lower bound (R_{ELB}).

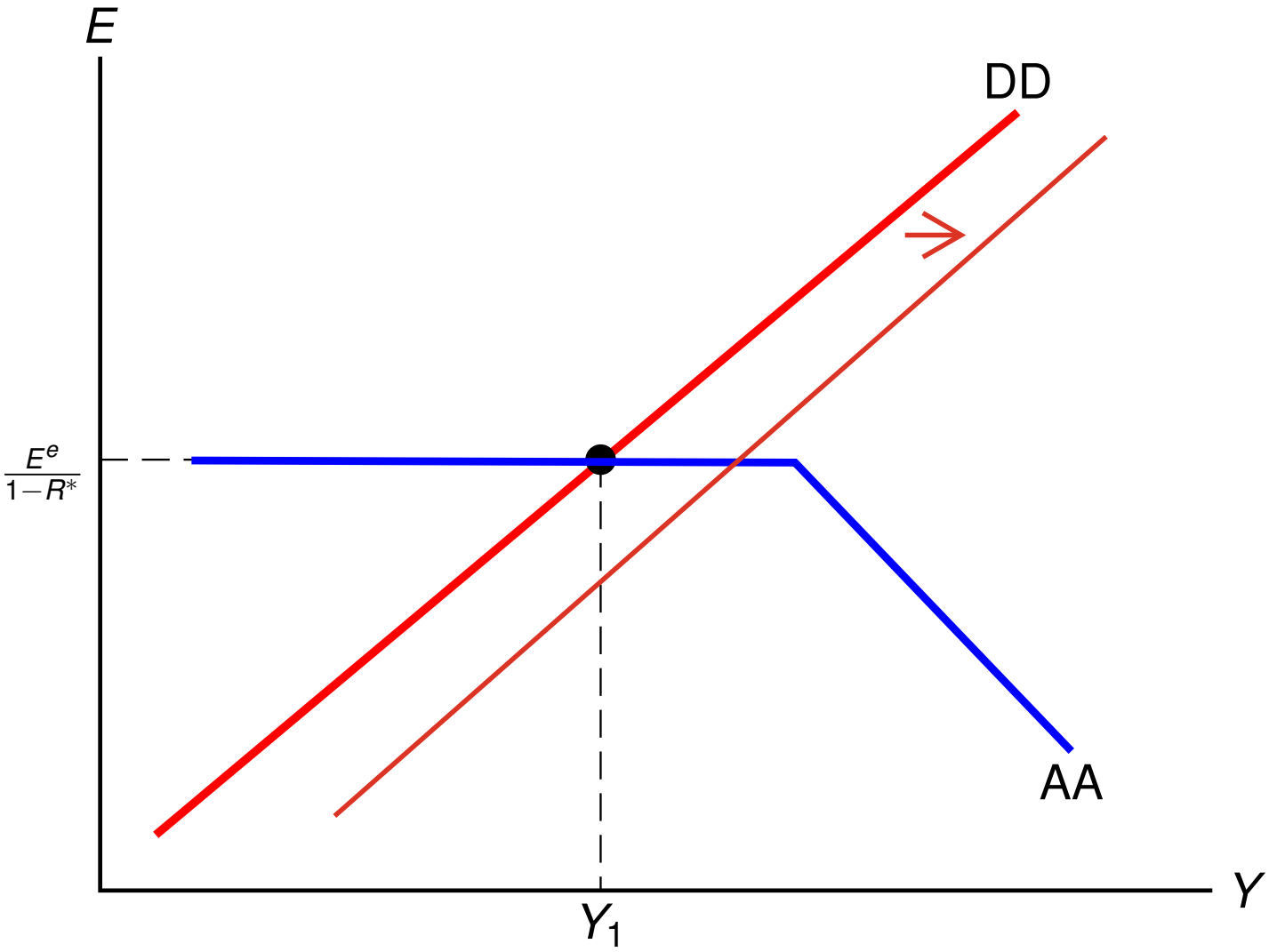
$$E = E^e/(1 + R_{\text{ELB}} - R^*)$$

If the effective lower bound is zero, this becomes

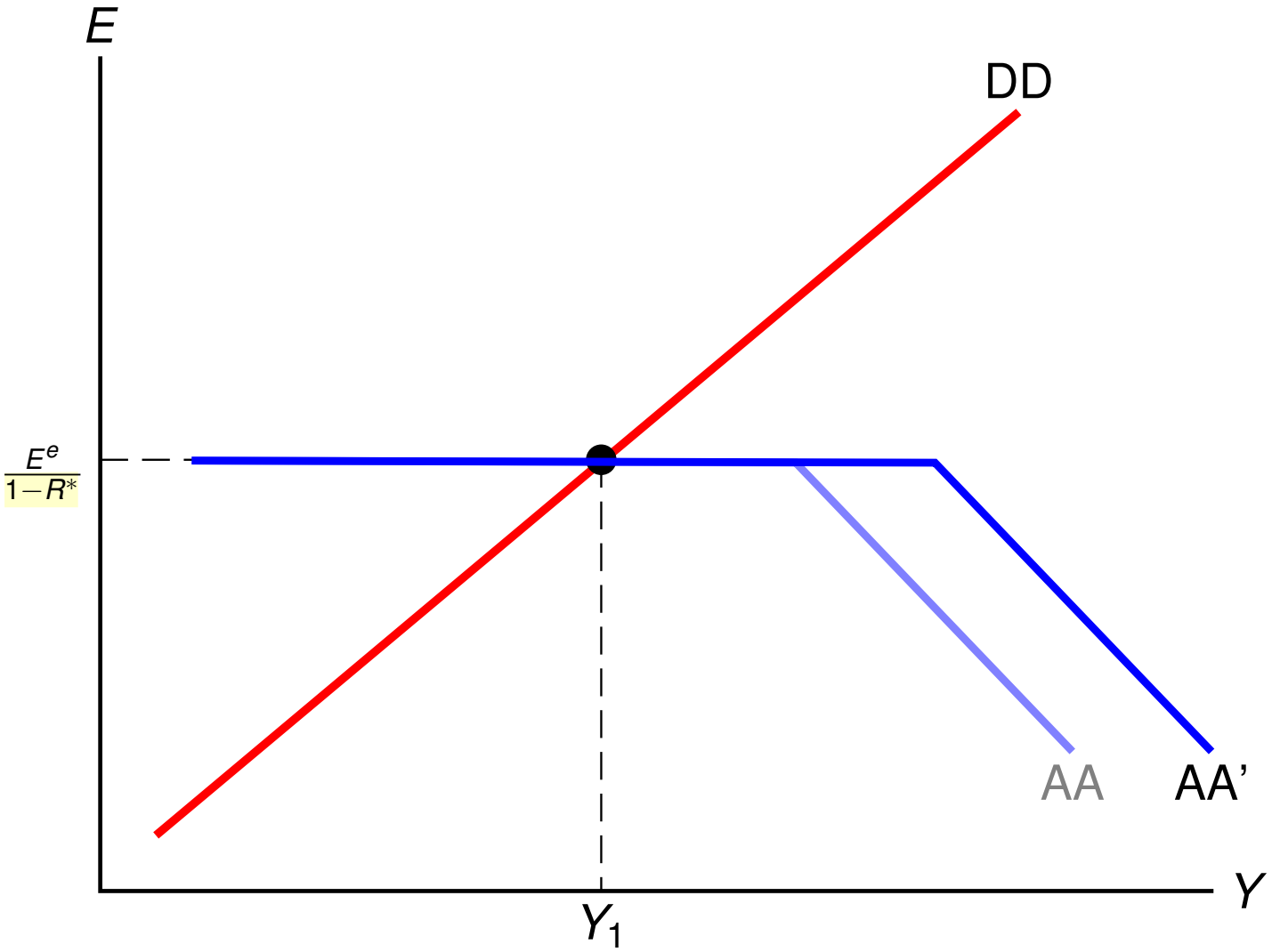
$$E = E^e/(1 - R^*)$$

- Given expectations about the exchange rate (and inflation) and fixed foreign interest rates, the exchange rate is fixed.
  - A purchase of domestic assets by the central bank does not lower the interest rate, nor does it change the exchange rate.

Liquidity Trap



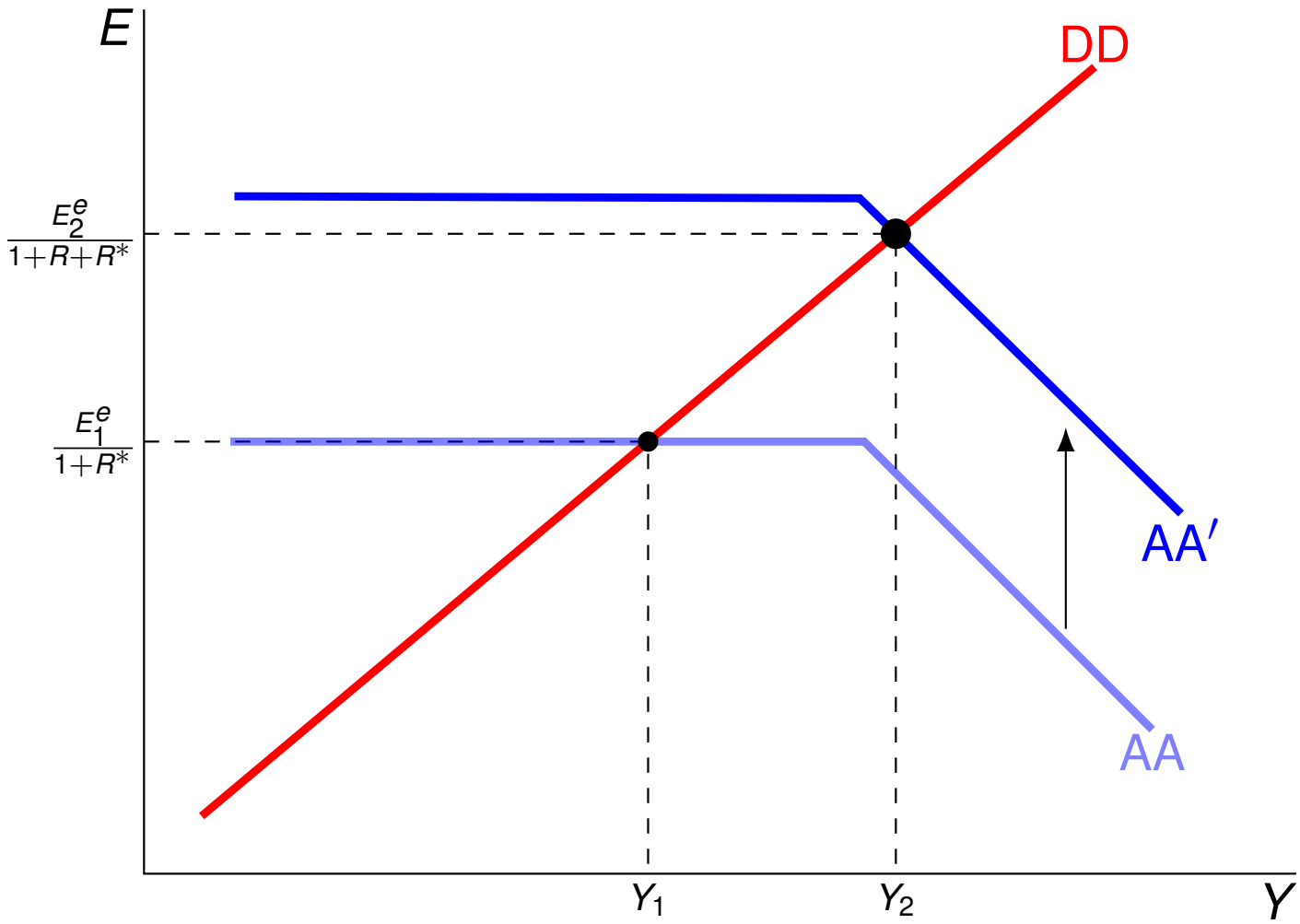
Temporary ↑M with a Liquidity Trap



Compare: KOMIF 11 Figure 6-19

If nominal interest rates are zero, a temporary monetary expansion will not lower interest rates and will not affect exchange rates nor output: a

Permanent ↑M with a Liquidity Trap



A permanent monetary expansion will raise expectations of inflation and cause markets to expect a depreciation of the domestic currency: inflationary money policy depreciates the currency and raises output.

Devaluation and a Liquidity Trap (cont.)

A devaluation of the currency could achieve the same goals if market expectations do not change: a devaluation raises output.

Interest Rates, Exchange Rates and a Liquidity Trap (cont.)

- Prices and wages have fallen (deflation), allowing a real depreciation of Japanese products.
  - Low output and employment has gradually risen as prices, wages and the value of Japanese products have fallen.
- In addition, Japan has maintained low interest rates, has increased the growth rate of its money supply and has tried to depreciate the yen by purchasing international reserves.

Interest Rates, Exchange Ratesand a Liquidity Trap

Liquidity trap nominal interest rates fall so low that the central bank cannot encourage people to hold more liquid assets (money).

At some low interest rate, people are indifferent between holding money and interest bearing assets

Stop

Appendices

Exchange-Rate Pass Through

Exchange-rate pass through: the percentage by which import prices change when the value of the domestic currency changes by 1%.

Pass through may be less than 100% due to

- price discrimination in different countries.
- price-setting firms may decide not to match changes in the exchange rate with changes in prices of foreign products

Pass through less than 100% dampens the effect of depreciation or appreciation on the current account.

- smaller decline in CA (smaller J-curve)
- but also: smaller volume effects

DD-AA Model Assumptions

pass through rate is 100%:

- import prices in domestic currency exactly match a depreciation of the domestic currency.
- prices fixed in domestic currency: nominal depreciation implies real depreciation

ML condition is satisfied:

- the volume effect dominates the value effect.
- a real depreciation improves the current account

Exchange Rates and Real Exchange Rates

- Nov 10, 2007
  - 59.92 Icelandic króna per USD
- Nov 10, 2008
  - 128.78 Icelandic króna per USD
- Depreciation over the period: 114.92%
- Inflation over the period: 15.90%
- HUGE real depreciation: 99.02%

Depreciation in Iceland (Great Recession)

Real Depreciation in Iceland (Great Recession)

Negative Interest Rates

- Traditional wisdom: R < 0 impossible
  - People would just hold cash ($\rightarrow$ 0 rate of return)
- Reality:
  - holding cash is risky
  - compare: people pay for depositories for valuables
- Reality (1970s):
  - Switzerland paid negative interest on foreign deposits
- response to speculative interest in owning Swiss Francs
- traditionally considered a very special case

Negative Interest Rates: 2016

Source: http://www.nytimes.com/2016/02/13/upshot/negative-interest-rates-are-spreading-across-the-wo
html

Negative Interest Rates: ECB

June 2014

- ECB cut its headline interest rate to a record low of 0.15%
- ECB also imposed negative interest rates of -0.1% on deposits by eurozone banks
  idea: encourage lending to small firms (rather than cash hoarding)

Negative Interest Rates: EU 2014

September 2014

- German and Swiss three-year yields dropped below zero

Negative Interest Rates: Japan

- Reality (late 1998, early 1999):
  - Western banks paid negative interest on yen interbank deposits
- Note: Japanese banks *chose* Western over local institutions based on perceived risk
  - negative interest rates on short-term Japanese gvt bills
- Reality (February 1999):
  - BoJ adopts "zero interest rate policy")
  - Note arbitrage opportunity:
- foreign banks increased their holdins at BoJ!
- (BoJ imposes limits)
- Reality (January 2003):
  - Japanese interbank rate <0

Liquidity Trap and Monetary Policy

- Temporary Monetary Expansion
  - shifts out M/P
  - but no effect on R
  - therefore completely ineffective
- Permanent Monetary Expansion
  - has effects by changing expectations
  - permanent M increase $\rightarrow$ increase expected E

Japan's Policy Choices

- Many observers urged monetary expansion or active devaluation.
- New BoJ governors (since March 2003)
  - increased the growth of the money supply
  - purchased international reserves
- Did Japan court deflation (price adjustment policy)?
  - prices and wages fall over time (deflation)
  - produce a real depreciation of Japanese products
  - stimulate demand $\rightarrow$ expand economy
- Fiscal Expansion
  - a fiscal expansion could work
  - high public debt made policy makers cautious
  - primary deficit actually showed signs of tightening in early noughts

Another Option

- Export expansion - Japan got lucky: 2002 export boom
  - largely due to China's growth

Interest Rates and Investment: More Details

Interest Rates

- Our DD-AA model assumed investment expenditure is exogenous.
- Some parts of investment clearly respond to interest rate
  - Residential fixed investment
- Investment projects funded by saved or borrowed funds
  - interest rate represents the (real) opportunity cost cost
  - A higher interest rate means less investment expenditure.
- But see Chetty (2007 REStud): Interest Rates, Irreversibility, and Backward-Bending Investment

Interest Rates

- Other expenditure may depend on the interest rate.
  - A higher interest rate makes saving more attractive and consumption expenditure (on domestic and foreign products) less attractive.
- But there are conflicting income and substitution effects
- And the effect of the interest rate appears to be much larger on investment expenditure than it is on consumption expenditure and imports.

Interest Rate Sensitive Aggregate Demand

Government purchases are exogenous.
Investment is a function of the real interest rate.
Current account is a function of the real exchange rate, disposable income and the real interest rate.
Consumption is a functionof disposable income and possibly the real interest rate.

$$D = C[Y - T, R - \pi^e] + I[R - \pi^e] + G + CA[EP^*/P, Y - T, R - \pi^e]$$

Or more simply:

$$D = D[EP^*/P, Y - T, R - \pi^e, G]$$

Interest Rates

- Treat expected inflation as exogenous for now
  - $I = I[R] \qquad I' < 0$
  - $R = R^* + E^e/E - 1$
  - $I = I[R^* + E^e/E - 1]$
- Now up E => down R => up I (extra stimulus)
  - DD flatter
  - Also: R^* and E^e become shift factors for DD curve

IS-LM Model

We will skip this unless there is eager demand.

- Instead of relating exchange rates and output, the IS-LM relates interest rates and output.
- In equilibrium, aggregate output = aggregate demand

$$Y = D[EP*/P, Y - T, R - \pi^e, G]$$

- In equilibrium, interest parity holds
  - R = R* + (Ee-E)/E
  - E(1+R) = ER* + Ee
  - E(1+R- R*) = Ee
  - E = Ee/(1+R- R*)

IS Curve

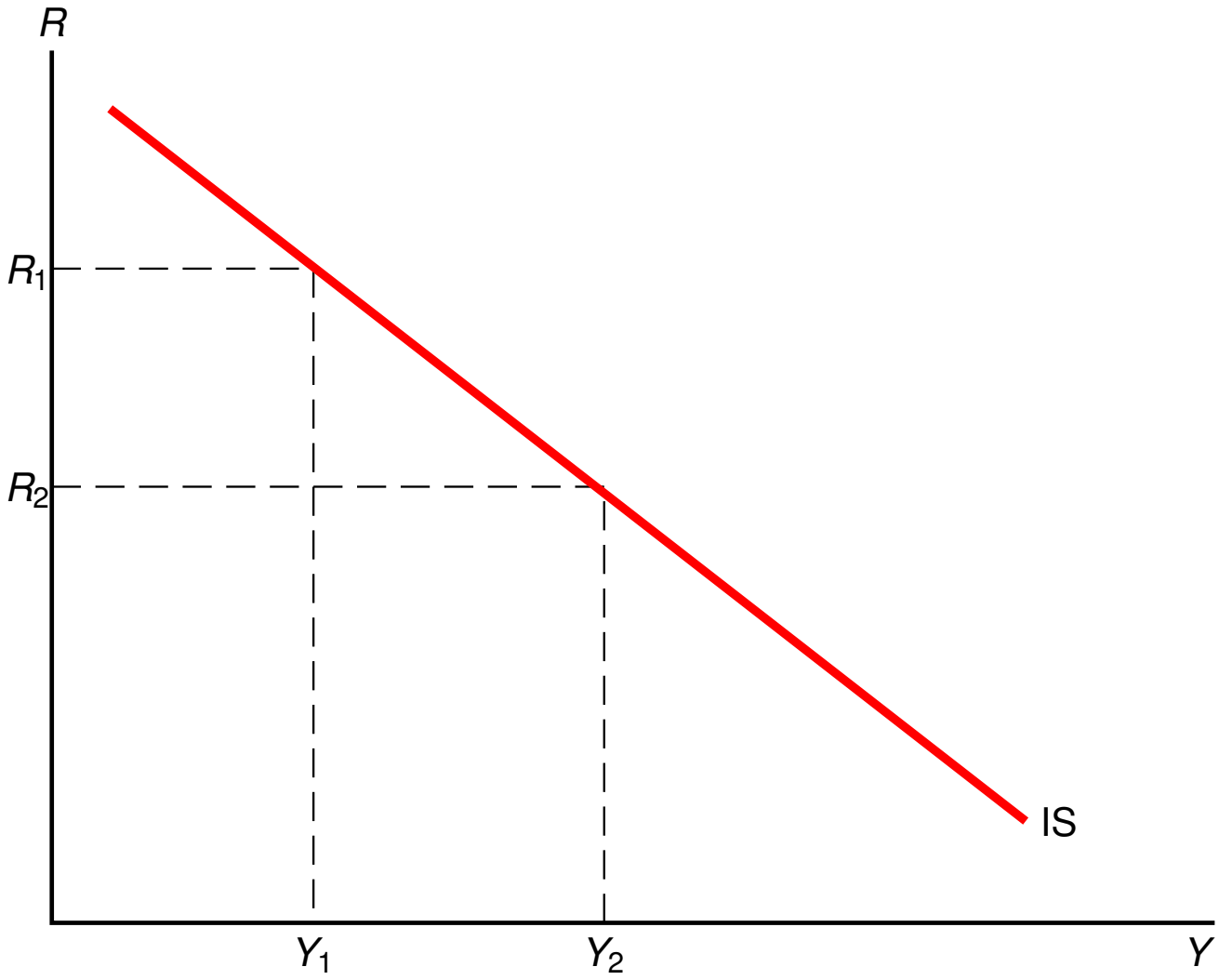
$$Y = D[E^e P* / P(1 + R - R*), Y - T, R - \pi^e, G]$$

Exogenous: E^e, P^*, P, R^*, T, π^e, and G.

Commodity markets are in equilibrium along the IS curve.

- combinations of interest rates and output such that aggregate demand equals aggregate output.
- $\downarrow$R $\rightarrow$ $\uparrow$I (and possibly C and M) $\rightarrow$ $\uparrow$AD -> $\uparrow$Y.
- The IS curve slopes down.

IS Curve



LM Curve

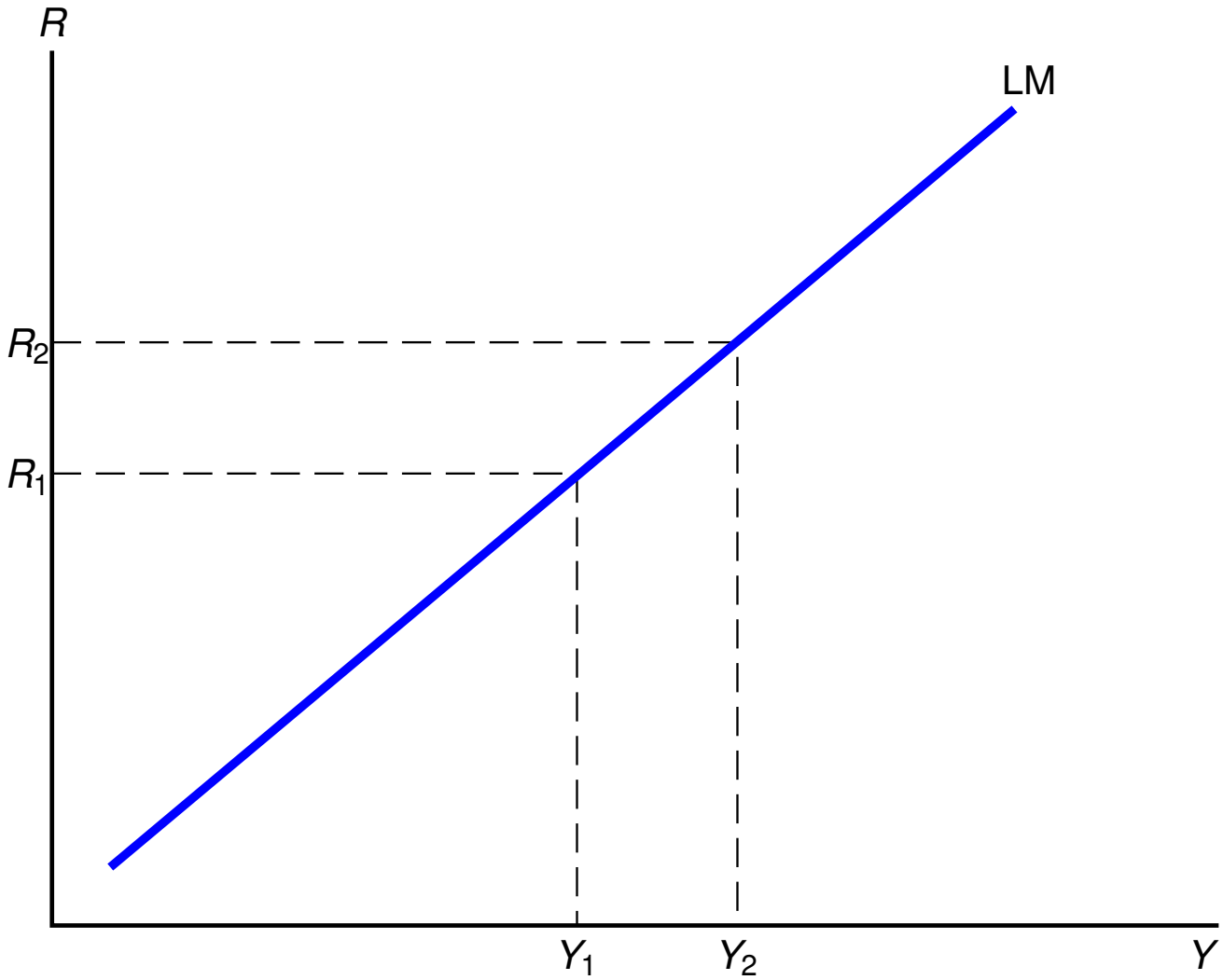
The money market is in equilibrium along the LM curve.

- Ms/P= L(R,Y)
- combinations of interest rates and output such that the money market is in equilibrium, given exogenous P and M

The LM curve slopes up.

- $\uparrow$Y $\rightarrow$ $\uparrow$L $\rightarrow$ $\uparrow$R (in equilibrium)

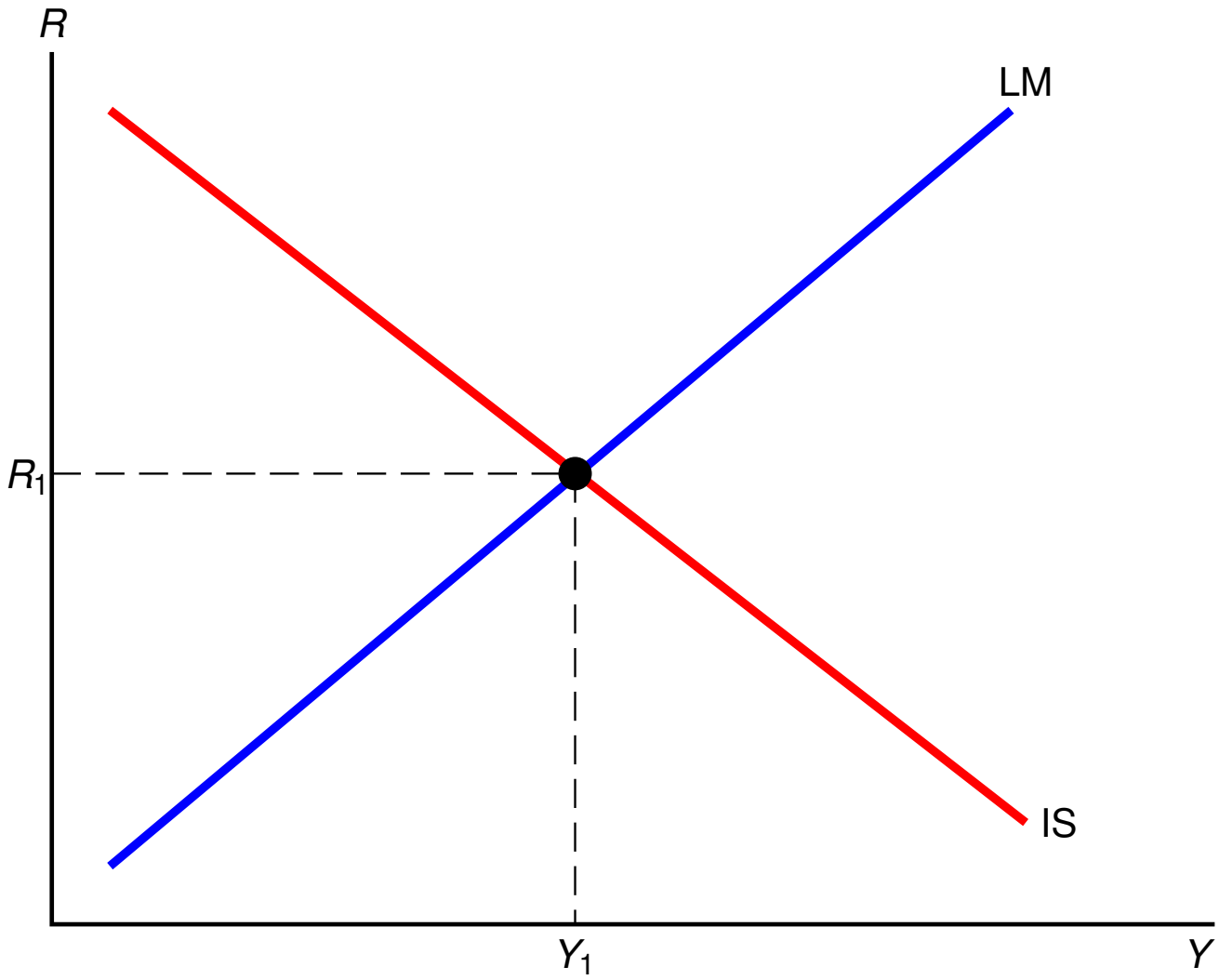
IS Curve



Equilibrium in the IS-LM Model

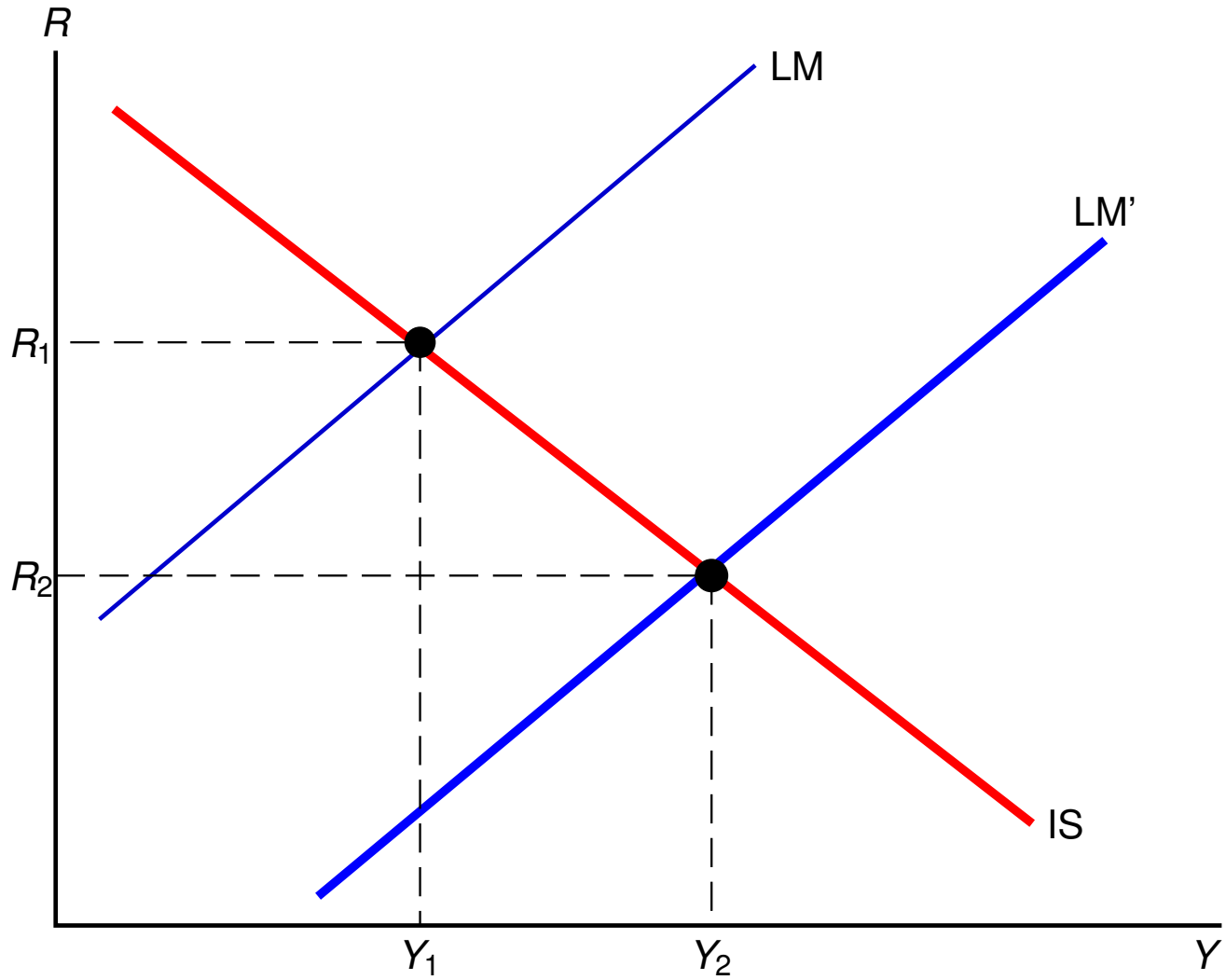
Commodity markets are in equilibrium along the IS curve.
Money market is in equilibrium along the LM curve.
Both markets are in equilibrium where the two curves intersect.

Equilibrium in the IS-LM Model

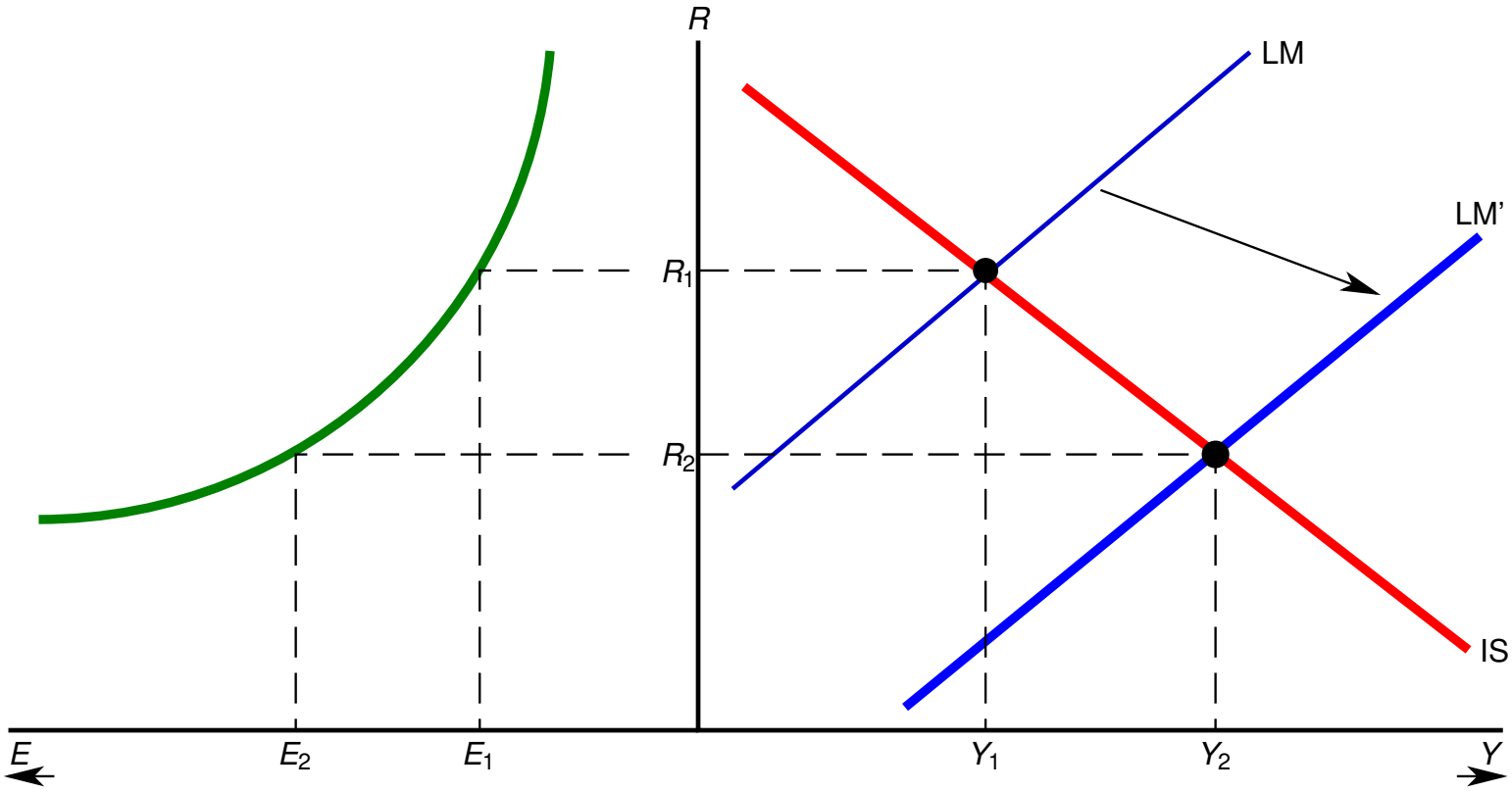


Commodity *and* money markets are in equilibrium at Y1, R1

Effects of Temporary Changes in the Money Supply

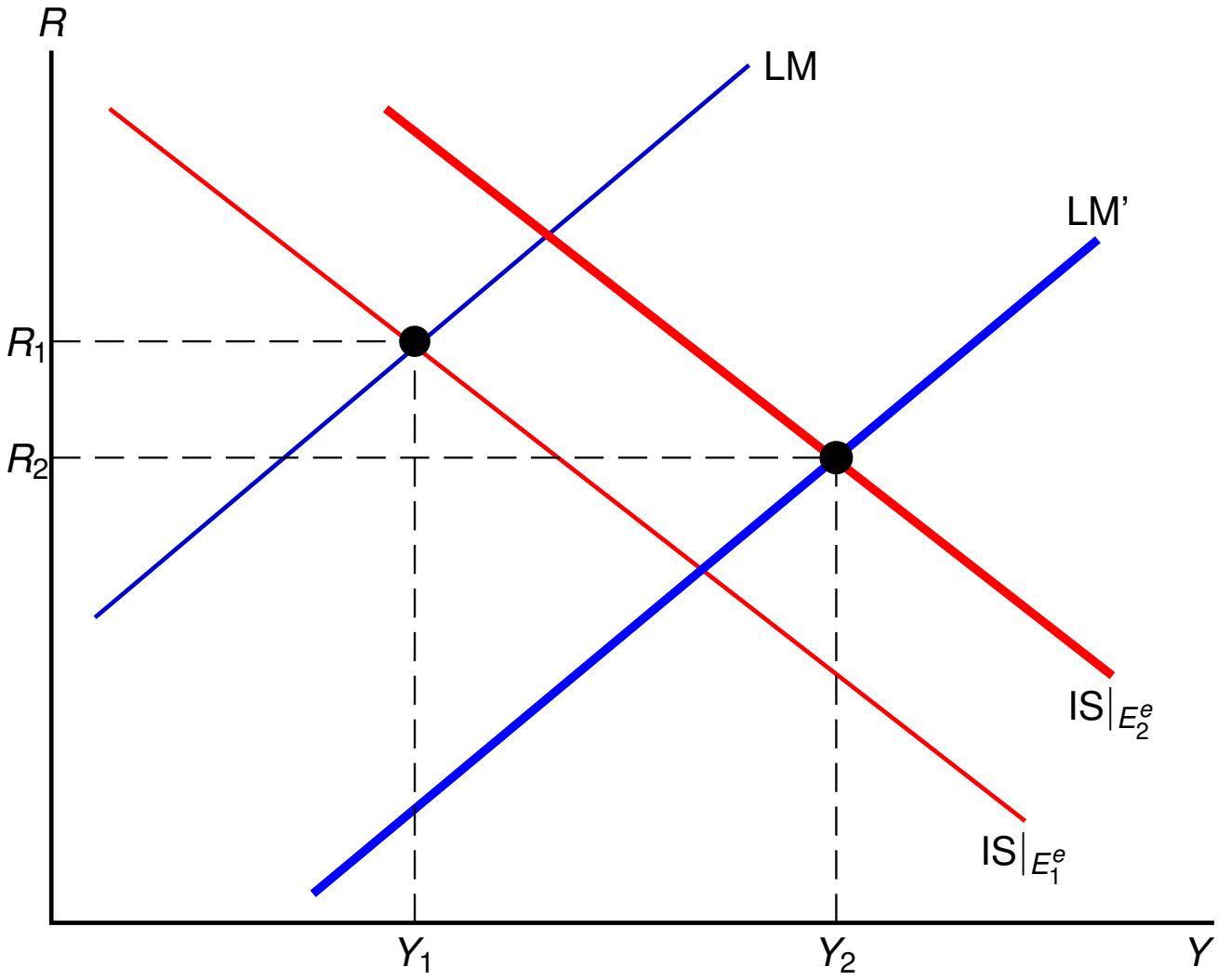


Effects of Temporary Changes in the Money Supply

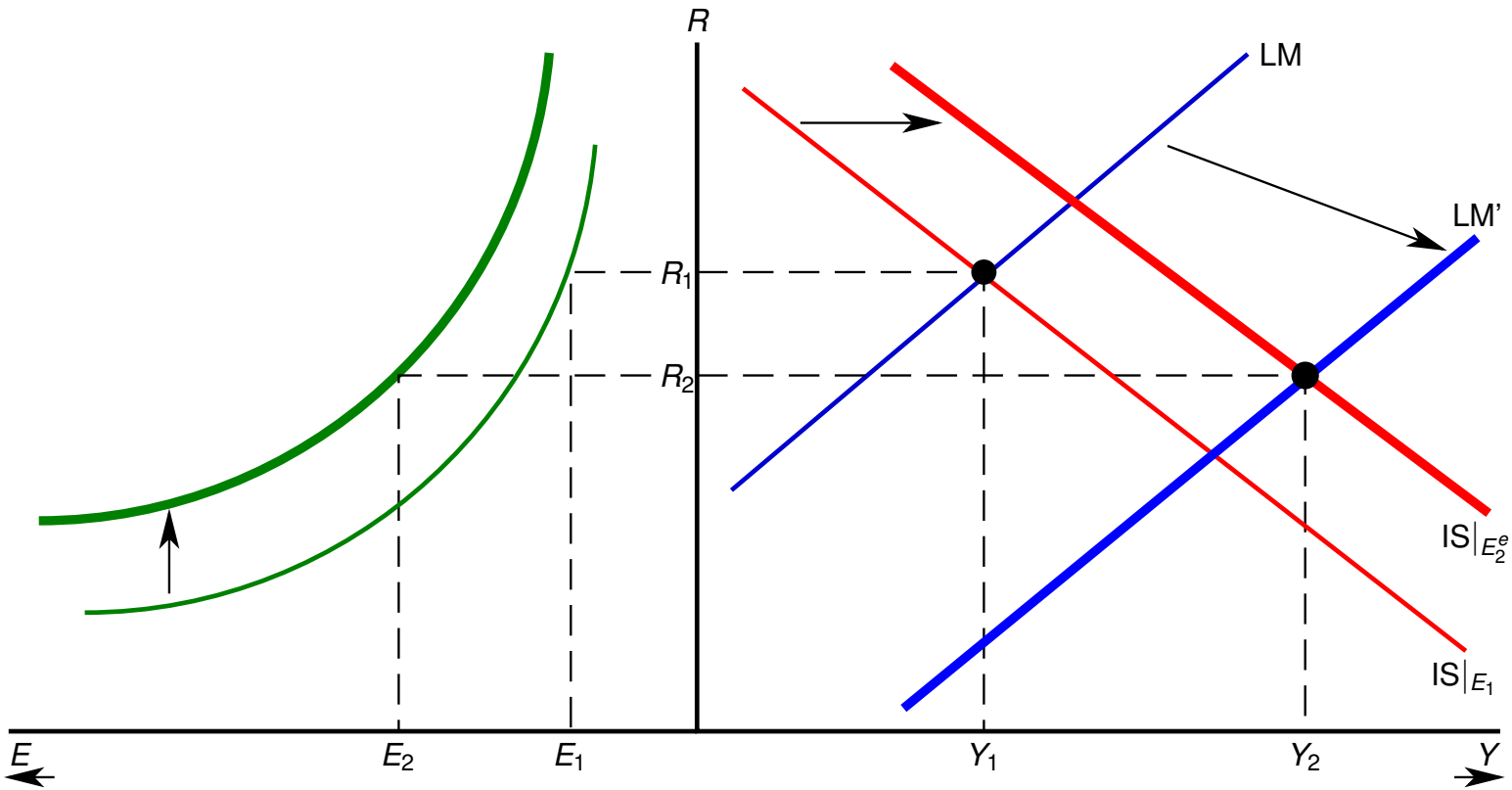


Compare: KOM Figure 17-ISLM01

SR Effects of Permanent ↑M (IS-LM)

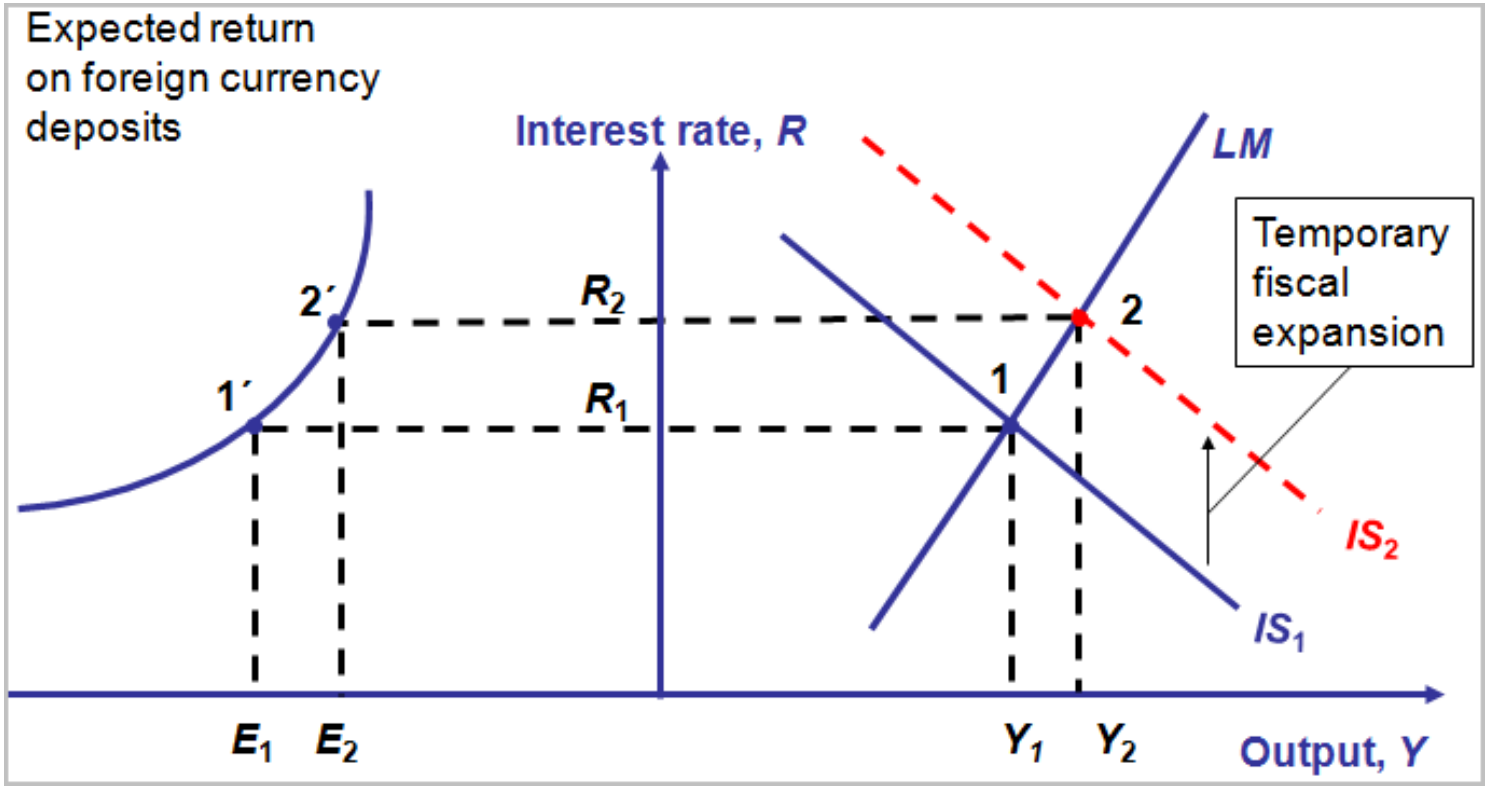


SR Effects of Permanent ↑M (IS-LM)



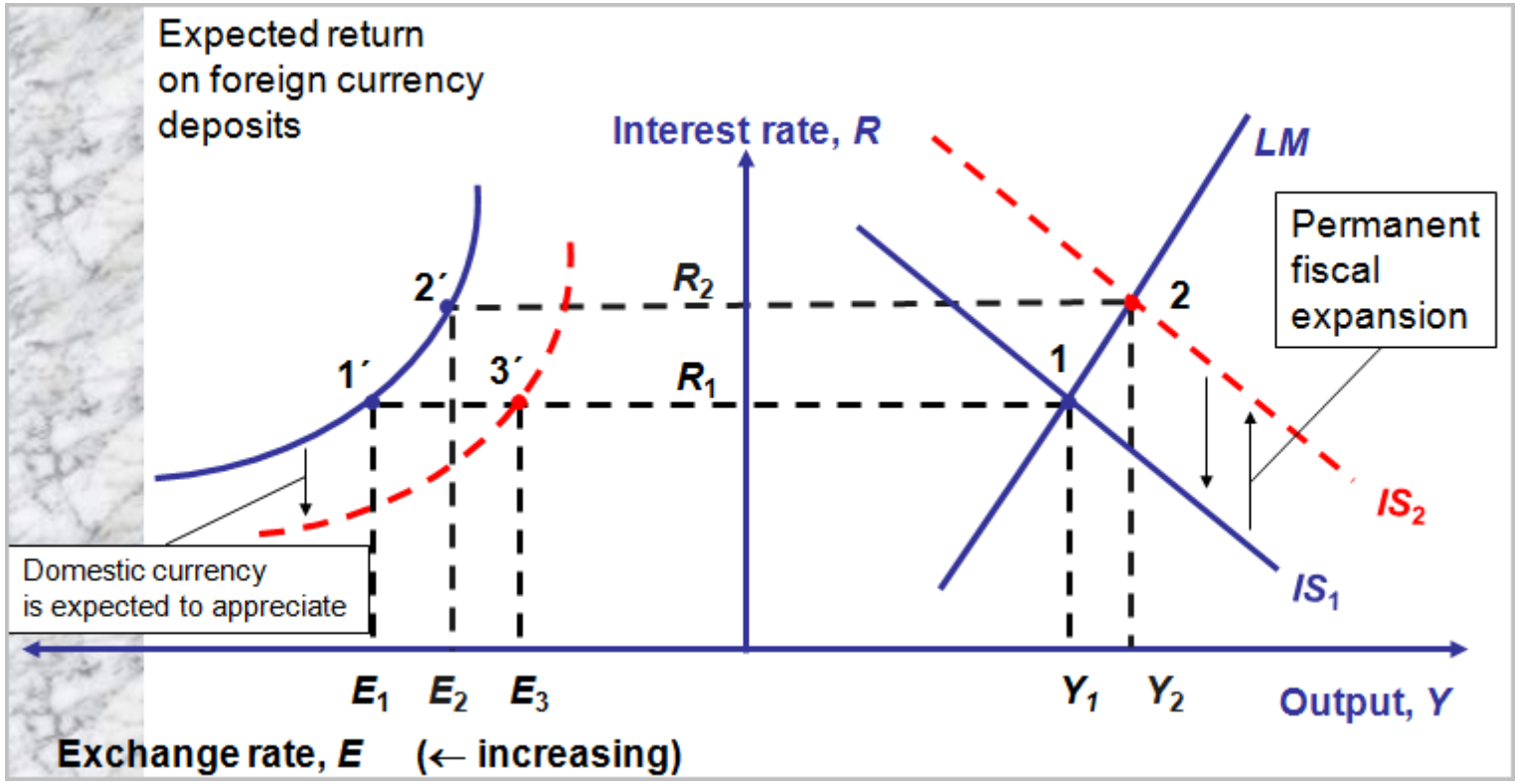
Compare: KOM Figure 17-ISLM02

Effects of Temporary Changes in Fiscal Policy



Source: KOM Figure 17-ISLM03

Effects of Permanent Changes in Fiscal Policy



Source: KOM Figure 17-ISLM04

Summary

- Aggregate demand (D) responds to disposable income (Y-T) and the real exchange rate (q=EP*/P).
- The AA illustrates asset markets equilibrium: (Y,E) combinations such that M/P=L *and* interest parity holds.
- The DD curve illustrates goods market equilibrium: (Y,E) combinations such that D=Y

Summary

- In the DD-AA model, we assume the Marshall-Lerner condition is satisfied
  - so a depreciation of the domestic currency improves the current account and increases aggregate demand)
  - in reality we may have a J-curve, where CA initially deteriorates because the value effect initially dominates the volume effect.

Summary: Temporary Policy Shocks

- Temporary $\uparrow$M $\rightarrow$ temporary $\uparrow$Y and temporary $\uparrow$E
- Temporary $\uparrow$G $\rightarrow$ temporary $\uparrow$Y and temporary $\downarrow$E

Summary: Permanent Policy Shocks

- Permanent $\uparrow$M $\rightarrow$ temporary $\uparrow$Y and temporary overshooting, with permanent $\uparrow$E
- Permanent $\uparrow$G $\rightarrow$ no change in Y but permanent $\downarrow$E

Summary: IS-LM

- The IS-LM model compares interest rates with output.
- The IS curve illustrates (Y,R) combinations such that D=Y
- The LM curve illustrates (Y,R) combinations such that M/P=L(R,Y)
- The IS-LM model gives basically the same results
  - tends to underplay Ee
  - captures interest rate effects on D, which our model ignored

US Economic Stimulus Act of 2008

Response to the financial crisis and Great Recession (2007/2008–2009).

Feb 13, 2008

- Bush signs into law

Response to

- 2007 subprime mortgage crisis and credit crunch
- increasing evidence of economic slowdown

Tax rebates and investment incentives

- $152 B budget cost projected for 2008
- $124 B additional cost over 10 years

Evidence of substantial stimulus effect?

- limited, but Broda and Parker (2008) find some evidence of increased household spending immediately following receipt of the rebate.

China (PRC) Fiscal Stimulus 2008

November 2008

- Announced $586 B over two years

Reaction to

- global economic crisis (“Great Recession”)
- growth slowdown (perhaps to 6%, vs. 10% p.a.)
- factory closing and mass layoffs in the south

Comment:

- G/Y in China low relative to EU and US

American Recovery and Reinvestment Act of 2009 (ARRA)

CBO and the staff of the Joint Committee on Taxation estimated ARRA would increase budget deficits by $787 billion between fiscal years 2009 and 2019.
Later CBO estimates: $814 billion, about half in fiscal year 2010

Effect of 2009 Stimulus on Employment and Output

CBO's model-based estimates say ARRA:

- Raised the level of real (inflation-adjusted) gross domestic product (GDP) by between 1.7 percent and 4.5 percent,
- Lowered the unemployment rate by between 0.7 percentage points and 1.8 percentage points,
- Increased the number of people employed by between 1.4 million and 3.3 million, and
- Increased the number of full-time-equivalent (FTE) jobs by 2.0 million to 4.8 million compared with what those amounts would have been otherwise. (Increases in FTE jobs include shifts from part-time to full-time work or overtime and are thus generally larger than increases in the number of employed workers.)

The effects of ARRA on output and employment are believed largest during 2010.

Source: http://cboblog.cbo.gov/?p=1326

G/Y and G/Yf in the U.S.

Source: https://fred.stlouisfed.org/graph/fredgraph.png?g=MYyI

Government Outlays vs GDP in the U.S.

Source: https://fred.stlouisfed.org/graph/fredgraph.png?g=MYCF